JOURNAL

OF THE

ASIATIC SOCIETY.

No. V. 1864.

On the Origin of the Hindví Language and its Relation to the Urdu Dialect.—By Bábu Ra'jendrala'la Mitra. *Corresponding Member of the German and the American Oriental Societies.*

[*Read* 12 *August*, 1864.—*Revised* 10*th October*, 1864.]

The history of our vernacular dialects, like that of our social and political condition during the Hindu period, remains yet to be written. It is not remarkable, therefore, that considerable difference of opinion should exist as to their origin. Our Sanskritists take every thing to be Sanskritic. Those of our philologers who have devoted much of their time to the dialects of the south of India, cannot, from habit and long association, look at an Indian dialect from other than a Turanian stand-point. And most of our Persian and Arabic scholars, in the same way, observe every thing through a Semitic medium. Hence it is that the Hindví has been sometimes called a Sanskritic, sometimes a Turanian, and sometimes a Semitic dialect. The balance of opinion, however, now preponderates in favour of the theory which assigns to it a Sanskrita origin. It has been shewn that the affinity of its roots is unmistakeably Aryan, that its phonology and laws of permutation are peculiarly Sanskritic, and that the number of Sanskrita vocables traceable in it, amount, at the lowest computation, to 90 per cent. The discussion on the subject has, however, not yet been brought to a close. Even at the last meeting of this Society, my learned and respected friend, Capt. Lees, in his valuable essay on the Romanising of Indian Alphabets, stated that the Hindustáni had not an alphabet of its own, and was therefore a fit

dialect to be written down in the Roman characters. It may not be uninteresting therefore to enquire what is the origin of the Hindví, the parent of the Hindustáni, and how far is it removed from the original Sanskrita to be disentitled to the use of the Nágarí alphabet as its natural symbolical representative; although in making the enquiry, I shall necessarily be obliged to run over ground which has already been very carefully traversed by some of the most distinguished philologers of the day, and to repeat much that is generally well known and admitted.

The Hindví is by far the most important of all the vernacular dialects of India. It is the language of the most civilised portion of the Hindu race, from the eastern boundary of Behar to the foot of the Solimáni Range, and from the Vindhya to the Terai. The Gúrkhas have carried it to Kemaoon and Nepal, and as a *lingua franca* it is intelligible everywhere from the Kohistan of Peshawar to Assam, and from Kashmir to Cape Comorin. Its history is traceable for a thousand years, and its literary treasures are richer and more extensive than of any other modern Indian dialect, the Telegoo excepted. No doubt it has not always been the same, nor is it exactly alike every where over the vast tract of country in which it prevails. For a living language growing with the progress of time, and diversely influenced in different places by various physical, political and ethnic causes, such a thing would be impossible. But there is sufficient similitude between the language of the *Prithvíráya-Ráso*, the most ancient Hindví work extant, and the Hindví of our day, and between the several dialects of Hindví, Hindustáni, Braja Bháshá, and Ráñgı into which the modern Hindví is divided, to shew that they are a essentially one—dialectic varieties of the same language—branches of the same stem, and not issues from different trunks.

The *Prithvíráya-Ráso* was written nearly nine hundred years ag and yet the difference between its language and that of the *Premaság* one of the most modern books in the Hindví, is not even so great —certainly not greater than—that between the languages of Chauc and of the *Times* newspaper, and whatever that is, it is due more to t use of obsolete and uncouth words than to any marked formal pec liarities. Chand, the author of the *Prithvíráya-Ráso*, has been ve aptly described by the learned de Tassy as the Homer of the Rájput

* Chand, qu' on a nommé l' Homère des Rajpouts, est certainement le p populaire des poétes Hindví. De Tassy's Rudiments de la Langue hindví, p.

He was a minstrel in the court of Pṛithvíráj, the valiant knight of Kanouj, and appealed to the people in language suited to their capacity. It will be no presumption then to take the language of his epic as the vernacular of the then flourishing kingdom of Kanouj and of Northern India generally. How long before the time of Chand, that language was the vernacular of India, it is impossible now to determine, for from the time of Vikramáditya the great to that of Pṛithvíráj, we have no reliable information of any kind regarding the vernaculars. The literary work of every-day life was in those days transacted in the Sanskrita, and the language of familiar intercourse was never thought worthy of record.

Passing over *per saltum* the gap between the time of Pṛithvíráj and Vikrama, we find in the first century B. C., a number of dialects bearing the names of some of the principal provinces of India, such as Behar, Mahratta, &c. These were undoubtedly the vernaculars of those provinces at the time, for they could not otherwise have taken their local designations, nor assumed the position they held in the dramatic literature of the time of Vikramáditya. Their mutual differences were but slight, not much more prominent than what may be noticed in the English as spoken in London, Wales and Yorkshire; and they were all known by the common name of the Prákṛita. Professor Wilson, it is true, was of opinion that the Prákṛita could not have been a spoken dialect, but his arguments have been so fully met and so frequently refuted by Max Müller, Sykes, Weber, Lassen and a host of other distinguished scholars, that I need not dwell upon them here.

Two centuries before Vikramáditya, As'oka appealed to his people in favour of Buddhism in a language which has been called the Pàli. It was a form of Prákṛita standing midway between the language of Vararuchi's grammar and the Sanskrita of Páṇini. Whether it was ever a vernacular of India has been doubted, and some have gone the length of calling it a "quasi religious" or a "sacred dialect." But "a careful examination of the As'oka edicts," to quote what I have elsewhere said, "clearly shews that it is a stage in the progress or growth of the Sanskrita in its onward course from the Vedic period to the vernaculars of our day, produced by a natural process of phonetic decay and dialectic regeneration, which can never be possible except in the case of a spoken dialect. Professor Max Müller, advert-

ing to these changes, justly says, they 'take place gradually, but surely, and what is more important, they are completely beyond the reach or control of the free will of man.' No more could As'oka and his monks devise them for religious purposes, than change the direction of the monsoons or retard the progress of the tides. It is said that Marcellus, the grammarian, once addressed the emperor Tiberius, when he had made a mistake, saying, 'Cæsar, thou canst give the Roman citizenship to man, but not to words;' and *mutatis mutandis*, the remark applies with just as much force to As'oka as to Tiberius. There can be no doubt that As'oka was one of the mightiest sovereigns of India. His sway extended from Dhauli on the sea board of Orissa to Kapur-di-Giri in Afghanistan, and from Bakra in the north-east to Junagar in Guzerat. His clergy and missionaries numbered by millions; they had penetrated the farthest limits of Hindustan proper, and had most probably gone as far as Bamian on the borders of the Persian empire. Religious enthusiasm was at its height in his days, and he was the greatest enthusiast in the cause of the religion of his adoption. He devised his edicts to promote that religion; had them written in the same words for all parts of his kingdom; and used exactly the same form everywhere: but with all his imperial power and influence, he could not touch a single syllable of the grammar which prevailed in the different parts of his dominions. In the north-west, the three sibilants, the *r* above and below compound consonants, the neglect of the long and short vowels, and other dialectic peculiarities, rode rough-shod over the original as devised by him and his ministers and apostles in his palace, and recorded in Allahabad and Delhi; while at Dhauli nothing has been able to prevent the letter *l* entirely superseding the letter *r* of the edicts. Had the language under notice been a "quasi religious," or a "sacred dialect," it would have been found identically the same in all parts of India, for the characters used in the Delhi, Allahabad, Dhauli and Junagar records are the same, and if uniformity had been sought, it could have been most easily secured. But popularity was evidently what was most desired, and therefore concessions were freely made in favour of the vernaculars of the different provinces at the expense of uniformity. Unless this be admitted, it would be impossible to explain why the word *Rájá* of Delhi, written in the same characters, should in Cuttack change into *Lájá*. Had the language been a sacred

one, intended for the clergy only, no such concession would ever have been required. The Sanskrita of the Brahmanic priesthood is alike everywhere, and so is the Latin of the Roman Catholic clergy. It is the people whom As'oka wished to address, and accordingly adapted his language to the capacity and the idiom of his hearers." And if these arguments be admitted, and similar arguments have already led Dr. Max Müller, Mr. Muir and others to admit, that the Páli was the vernacular of India from Dhauli in Cuttack to Kapur-di-giri in the Yusafzai country in the time of As'oka, and for some time before and after it.

Ascending upwards to the time of the first great convocation of the Buddhist clergy, soon after the death of S'akya Siñha, we come across a kind of corrupt Sanskrita called the *Gáthá,* which was used for ballads and improvisations by the scalds and bards of that period. For reasons which I have already submitted to this Society in my paper on the Gáthá dialect, I take that language to be the first stage in the transition of the Sanskrita into the Prákṛita, and the vernacular of Brahmanic India in the fifth and sixth centuries before the Christian era.* For the purposes of the present enquiry we need not proceed further. We have the Gáthá proceeding directly from the Sanskrita and forming the vernacular of India in the sixth century, B. C.; the Páli following it in the third, and the Prákṛita in its different forms of Mágadhí, Saurasení, Mahráṭṭi, Pais'áchi, &c. in the first century of that era. How long the last flourished we know not, nor have we any information as to the transitions it underwent, or the dialect or dialects which succeeded it. But passing over a period of about a thousand years, we come to the Hindví in the tenth century, and the question hence arises, Is the Hindví a produce of the Prákṛita, or a different and distinct language which has succeeded it? Muir, De Tassy, and the German philologers generally, maintain the former position; while Crawford, Latham, Dr. Anderson of Bombay and others assume the latter. They all agree that no less than 90 per cent. of the vocables of the Hindví are Sanskrita; and if the affinity of its roots were alone to decide the question of its affiliation, there could be no doubt as to its claims to a Prákṛitic, and necessarily a Sanskritic origin. But, since a language is to be judged more by its formal than by

* Dr. J. Muir has adopted this opinion in his *Sanskrit Extracts,* Vol. II. p. 124 *et seq.*

its radical elements, and the formal elements of the Hindví are apparently very unlike those of the Sanskrita, but closely similar to those of the Scythic group of languages, it is argued that it must be a Turanian or Scythic, and not an Aryan dialect. To meet this, we must enter into some detail regarding the changes which the grammatical apparatus of the Sanskrita has undergone in some of the Sanskritic dialects, such as the Gáthá, the Páli and the Prákṛita and then trace its relation to the Hindví.

Beginning with the inflection of nouns, we find that the first step in the transition of the Sanskrita into the Gáthá, was the omission of the mark of the nominative singular—*s*, which after *a* assumed the form of the aspirate *visarga*. Where the Sanskrit said *Rámah*, the Gáthá was contented with *Ráma*. This was exactly what was to be expected, for the most prominent feature of the changes which led to the transition of the Vedic Sanskrita into the language of the Rámáyaṇa and the Mahábhárata was the softening down of harsh and difficult combinations of several consonants, and of elision of aspirates. The aspirate of the nominative singular was, besides, not common to all nouns, but only to themes ending in *a*. Words ending in consonants, in the vowel *ṛi* and in long *í* or *ú*, received no aspirate, and their analogy prompted the elision of it also after *a*. This elision in the Gáthá was, however, occasional and not universal. It retained the aspirate as often as it dropped it, and sometimes supplied its place by the letter *u*, and so all the three forms of *Rámah*, *Ráma* and *Rámu** are to be met with in the ballads of the Gáthá.

The *s* of the Sanskrit, which becomes a visarga after *a*, changes into *o* if an *a* follow it. But in the Zend, the latter condition is not necessary, hence *o* is the usual termination in the nominative singular, and it is its contraction that we meet with in the Gáthá in the form of *u*. The Páli of As'oka's edicts omits the *s*, but never takes the *o* or *u*; but in the Páli of Kátyáyana's grammar and as we find it in the Cingalese chronicles, the *o* is preferred to simple elision, so is it in the Prakṛita. Of the modern vernaculars the Braja Bháshá or the Hindví of Mathurá alone occasionally takes the *u*, but the others all drop all case-mark for the nominative. Thus the Sanskrit *Bálakah* becomes in Gathá *Bálaka* or *Bálaku*,* in Páli *Bálako*, in Prákṛita *Bálaka*, and in

* I have not noticed these words declined in the different forms, but the forms occur in connexion with different words.

Hindví *Bálak* or *Bálaku.* The euphonic laws which regulate these changes are not yet known, but their operation is universal, and we accordingly find that the *s* of the Latin nominative singular is first dropped in the language of the Troubadours, in Provençal and French, but transformed into *o* in the Italian and Spanish. Thus the Latin *oculus,** eye becomes in Provençal *huel*, in French *œil*, in Italian *occhio*, and in Spanish *ojo;* the changes being almost parallel to what we have seen above.

The flexional termination for the *accusative*, like that of the nominative, has been either dropped or assimilated with the dative in almost all the modern vernaculars. This commenced as early as the time of the *Apabhramsa* in which the Sanskrit accusative mark *m* used to be frequently if not uniformly omitted. In the Hindví, this mark is *ko*, which in some of its patois, in poetry, and in some of the earlier writings, occurs in the form of *ku*, *koñ*, *kauñ*, *kaha*, *kañha*, *kahañ* and *hi*. Apparently this termination is perfectly distinct from the Sanskrita inflection, for both the accusative and the dative, and this has led to much discussion as to the ethnology of the Hindví speaking races of India. Dr. Kay, (ante xxi. p. 109) thought the *ko* of the Hindví and the *ke* of the Bengali, came from the Tartar suffix *ka*, and Dr. Caldwell bases on the existence of this particle his strongest argument in favour of the Dravidian origin of the Hindví. He says, "of all the analogies between the North Indian dialects and the Southern, this is the *clearest and most important*, and it cannot but be regarded as betokening either an original connexion between the northern and the southern races, prior to the Brahman irruption, or the origination of both races from one and the same primitive Scythian stock." Dr. Trumpp, commenting upon this, observes: "At the first *coup d'œil* the identity of खे, के, को, etc., with the Dravidian dative case-affix *ku*, etc., seems to be quite convincing; yet, on nearer investigation, we shall find this comparison to turn out illusive. In the first instance, the fact speaks already very strongly against it, that the Maráthi, which is the closest neighbour to the Dravidian tongues of the south, has repudiated the use of के or को altogether, and used an affix, the origin of which we have attempted to fix, and as we hope, past controversy. We shall further see that the Gujaráṭi

* The Sanskrita *Akshi* (eye) the counterpart of *oculus*, runs a similar course, but as a neuter noun takes no case-mark in the nominative.

and Panjábi have also made up for the dative case by postpositions, borrowed from the Sanskrit, without the slightest reference to the Dravidian languages, and we may therefore reasonably expect the same fact for the remaining Arian dialects. It would certainly be wonderful if those Arian dialects which border immediately on the Dravidian idioms, should have warded off any Dravidian influence, and that those more to the north should have been tinged "deeply" with Scythian characteristics. Fortunately we are able to shew that such an assumption is not only gratuitous, but irreconcilable with the origin of the above-mentioned dative affixes. We derive the Sindhi खे and the Bengali के from the Sanskrit locative कृते, 'for the sake of,' 'on account of,' 'as regards,' being thus altogether identical in signification with the Márathí ला, Bengali *re*, etc. This will at once account for the aspiration of ख in the Sindhi खे, for this is not done by mere chance, but according to a fixed rule. [See my System of Sindhi Sounds, 1, and note.] In Bengali there is no such influence of *r* on the aspiration of a preceding or following consonant, and therefore we have simply के. The Sanskrit form कृते becomes in Prákṛit first किते, then (by the regular elision of त्) किए, and contracted to के, and in Sindhi by the influence of (elided *r*) खे.

"The Hindví and Hindustani form of this affix को (dialectically pronounced kú in the Deccan), which has apparently invited its comparison with the Tamil *kú*, etc., we derive in the same way from the Sanskrit accusative neuter कृतं, which is used adverbially with the same signification as the locative कृते. In Prakrit already, and still more so in the inferior dialects, the neuter is confounded with the masculine, (and in the modern dialects which have no neuter, the neuter has been altogether identified with the masculine); we have therefore first in Prákṛit, कितो, then again (by regular elision of त) कि ओ, and contracted को. We can thus satisfactorily account for all these three forms, खे, and को, and का; how Dr. Caldwell will now identify them with the Dravidian *ku*, etc., I cannot see. That this derivation of खे, के, and को rests not on a mere fancy of mine, is farther proved by the Sindhi particle रे *without*, which is derived in the way described, from the Sanskrit locative form ऋते, 'with the exception of,' 'excepted,' 'without;' Prákṛit first रिते, then रिए, and contracted रे."*

* Journal Rl. As. Soc. XIX. p. 392. The *re* turns up in the Bengali dative in the same way.

This explanation, ingenious as it is, is not satisfactory. *Kṛita* is a participle from the root *kṛi* "to do," and the dative or accusative signification attributed to it is altogether a forced one. The indeclinable particle *kṛite* is often used in Sanskrita in lieu of, or to imply, some forms of the dative; but its contraction does not yield *ko*. We must look elsewhere, therefore, for the origin of this puzzling particle, nor are we at all at a loss on the subject. Professor Max Müller derives the Bengálí dative *ke* from the Sanskrita suffix *ka*, which is largely used in modern Sanskrita as an expletive, and I think we may trace in it the germ of the Hindví *ko*. As a simple means of reducing nouns of different terminations to one standard, the syllable *ka* is a valuable adjunct, and scalds and improvisatores use it frequently to obviate the necessity of a multiplicity of declensions. Now, if we bear in mind that in the Gathá, the ordinary method of indicating the elision of a case-mark is by the addition of *u* as in the words *jayu* for *jayam*, *kṛitu* for *kṛitam*, *kálu* for *kálam*, &c., (vide my edition of the Lalita Vistara,) we find the missing components of *ku* which was the architype of *ko*, and which is still largely used in colloquial Hindví for both the dative and the accusative. We believe the *ka* at first took the ordinary accusative affix *m* after it. But gradually it wore down to a nasal *ñ* and the inflexion became *kañ*. This transition is by no means uncommon in Aryan languages. In Greek the Sanskrit accusative affix *m* passed into *n* at a very early period, and in Bengálí it is invariably sounded as *ñ*. Now if we apply the expletive *u* to this *kañ* it becomes *kuñ*, and in this form we meet with it in the Uriah, which has preserved its similitude to the Sanskrit with more care than any other Indian dialect. It also occurs in the Deccan Hindví, and in the Braja Bháshá. The prolongation of the *u* yields *koñ*, and this variously pronounced forms in Northern India *koñ*, *kauñ*, *ko*, and the rest.

The dative of the Sanskrit in the first person singular is *e* which added to *ka* makes, by the elision of *a*, the Bengálí dative *ke*. It is true that according to the rules of Pánini, the *e* of the dative after themes ending in *a* should change into *aya*, but as corruption is the result of a fanciful analogy on the part of the illiterate masses, it is not remarkable that the universal affix *e* should replace the especial *aya*. In the Gáthá the reverse of this often occurs and the especial *ena*, the instrumental ending of themes in *a*, is frequently used after themes ending in consonants instead of the more legitimate and general affix

á; the examples being *mahatena* for *mahatá*, *yasena* for *yasasá*, *rájena* for *rájñá*.

One form of the *instrumental* in the Sanskrit is *ná*. It is used after themes in *i*, *u* and *ṛi*. and the Hindví adopts it with but a slight change in the vowel, the endings being *na*, *ni*, *ne* and *neñ*. The similitude here is so close that we need not dwell on it at any length.

The Sanskrit *ablative* termination in the singular number of words ending in other than *a* is *as*. This changes into *hi* or *hinto* in the earlier Prákṛitas, and to *he* in the later, in which the ablative is confounded with the genitive. In the Bengálí the *hinto* passed into *haiñte* a little before the time of Chaitanya Deva, and subsequently into *haite*, the form in which we now have it. The *he* of the Prákritas, according to Dr. Trumpp, merged into *se* or *señ* in the Hindví on the ground of *h* and *s* being interchangeable, but we think the original Sanskrita *smát* the especial affix of the pronouns, offers a more probable source of *señ* and *se* than the secondary *he*. In either case the origin of the termination is purely Sanskritic. In the Braja Bháshá the *se* is generally replaced by *teiñ*, an obvious corruption of the Sanskrita *tas*.

The *genitive* affix in the Bengali and the Uriah is formed by hardening the Sanskrita *sya* into *ra*. But in all the other Aryan Indian dialects, a novel mode is adopted which is traceable only in the old Vedic language. According to Dr. Trumpp, "The noun, which ought to be placed in the genitive case, is changed into an adjective, by an adjectival affix, and thence follows naturally, that this so-called genitive, which is really and truly only an adjective, must agree in gender, case, and number with its governing noun, as every other adjective does. The adjectival affix, used thus, to make up for a genitive, varies in the different dialects * * * The Hindví and Hindustání have preserved the original Sanskrit adjectival affix क without changing into a palatal, viz., का; in Hindví we meet with the genitive affix कौ को. A further proof that these genitive affixes जो, चा, का, कौ, etc., are really the adjectival affix क of the Sanskrit, and the को of the Prákṛit, we have in the fact, that they all end in *o*, a *long vowel*, *ó* = *á*; as all those adjectives do, which are formed with this affix (see my system of formation of themes under the termination को.)"

The *locative* in the Sanskrita is *i* or *e*, which has been carefully preserved in the Bengalí, though the ablative *te* proceeding from the Sanskrita *tas* is occasionally used in a locative sense. The *e* changes

into *smin* after words of the class "*Púrva, &c.*" and this *smin* seems to have been adopted as a general termination for the locative in the Páli. In the Prákṛita it merged into *mmi*, and in the Hindví the *mmi* appears in the different forms of *meñ, mai, moñ, mañ, mahi*, &c. Dr. Trumpp has overlooked this obvious derivation in his "Declensional Features of the North Indian Vernacular," in which he says, "In Hindví and Hindustání the locative, as a case, has been quite lost, and only some vestiges of it remain, as: होते, or emphatic होतेहो, 'in being,' and thus a locative can be formed with all participles, present or past, which are generally looked upon by our European grammarians as indeclinable participles, but which are in reality only locatives as it is most clearly borne out by comparing the cognate dialects."* In some forms of the Hindví, the *me* of the locative is replaced by *pai* and rarely by *paiñ*, the origin of which we can trace only to the Sanskrita preposition *upara* "upon" which first changed to *par* in such sentences as *mupar* "on me," and subsequently to *pai*, the nasal affix being a euphonic adjunct which in the Braja Bháshá is largely introduced often without any obvious reason. The same was the case in the Bengalí four hundred years ago, and the *Chaitanya Charitámṛata* affords innumerable instances of its use in words like *jáyiñá, khañyiñyá* for the modern *jáyiyá, kháyiyá*, &c.

The *vocative* in the Hindví is identically the same as in most forms of the Sanskrita, being formed by the addition of the interjections *he, re, ahe* (for *ayi*,) &c. A few of the interjections are peculiar to the Hindví, but they offer nothing of importance for comment.

The *personal pronouns* are so obviously Sanskritic that we need not swell this paper by tracing the gradual changes which they have undergone from the time of the Prákṛitas to our own day. The only word which appears to some to be of doubtful origin is the third person *vah* plural *vai*, but the difficulty vanishes if the Sanskrit *asau* be taken as its archtype.

The verb generally undergoes a greater variety of changes than any other class of words. It is said that in some American languages, verbal roots may appear in no less than six thousand different forms. In Sanskrita, the changes are not so numerous, still they exceed three hundred. In Greek and Latin they are less, and in modern European languages generally very few; in English the least—not

* Journal Rl. As. Soc. Vol. XIX. p. 398.

more than six or seven in all. Still compared to nouns of their respective languages, the verbs assume a much greater variety of forms, and therefore their conjugational affixes offer the most ready materials for tracing their origin. This test applied to the Hindví fails entirely to detect in it the smallest amount of a Scythic or Dravidian element. No doubt the niceties of the Sanskrita conjugation, the ten classes, the three voices, the ten moods and tenses, have all disappeared in the Hindví, as they have more or less in all other modern vernaculars, whether Indian or European; but what is left to us is purely Sanskrita and not foreign, and we may fairly conclude therefore that what has disappeared was likewise Sanskritic, and that the whole system owes its origin to a Sanskrita source. The process has been that of decay and regeneration, and not of development and expansion. History does not afford us an instance of a language growing out of a rude state, developing new forms and gradually acquiring symmetry and perfection, such as the Latin out of the Spanish or the Italian. It is the perfect that wears out and readjusts its members when the first arrangement ceases to be expressive. Hence it is that we find in the Hindví, as in all other vernaculars, the original inflections losing their power and significance and yielding their places to verbs and participles, which in their turn wear out and assume the form of inflections. It is easy to suppose that the verbs which will most frequently adopt this auxiliary character are those which indicate "to be," "to exist," "to live," "to go." These in Sanskrita are *as*, *bhu*, *sthá* and *gam*, and they therefore constitute the principal auxiliaries in the conjugation of the Hindví.

The *bhu* of the Sanskrita becomes in the first person singular of the present tense *bhavámi*. In the Gáthá the process which converts *bhu* into *bhava* is partially carried out, and the word becomes *bhomi*. In the Prákṛita the *bhu* changes to *ho* and *huba* and those forms continue in all the Aryan Indian vernaculars. Some think the transition of *bhu* to *ho* to be unnatural and therefore assume it to be a non-Sanskrita word, but, besides the authority of Vararuchi who nineteen hundred years ago wrote down in his grammar the rule* that "in Prakrit *bhu* should be changed to *ho*, and *huba*," we find that notwithstanding the

* *Bhubo ho hubav.* Delius *Radices Prákriticæ*, p. 1. *B* and *h* were interchangeable even in the time of the Vedas and in the *Srauta Sutra* of Áswalayana, the same word is written at option both *gribhíta* and *grihíta*.

use of two thousand years the *ho* in the past tenses of the Braja Bháshá appears in its primitive form of *bha* in *Bhaye*, *Bhayethe*, *&c.* The conjugated form of the *ho* in the Prákṛita was *homi*, and in the Hindví *huñ*. In the definite present this again is intensified by the addition of the past participle *hotá* before it.

The past tense is formed by the past participle *hotá* with the aid of the Sanskrita *sthá* "to remain" changed to *thá*, the personal distinction being indicated by the alteration of the terminal vowel. The perfect is formed by the union of the present participle with the present tense, *huá-hoñ*. This duplication of the verb in the perfect tense is peculiarly Aryan. It occurs in Sanskrita, Greek, Latin, Zend, Anglo-Saxon and Gothic, and is by itself a strong proof in favour of the Sanskrita affiliation of the Hindví. In the pluperfect the *thá* again occurs as an inflection, the verb remaining in the form of the present participle *huá*. For the future tense the auxiliary is the root *gam* "to go" in the form of *gá* or *ge* added to the verb in the indicative present. This paraphrase is peculiar and not common in any other Sanskritic vernacular. Its analogue in the English may be traced in such phrases as *I am going to do.*

In the case of other verbs *ho* becomes an auxiliary for the perfect, the other tenses being conjugated in the same way as *ho;* it is not necessary, therefore, to adduce examples.

Nor is it necessary to dwell longer on the subject of the grammatical forms of the Hindví. What has been said will, I trust, be sufficient to shew the strong affinity which it has to the Sanskrita, and the relation it bears to the Prákṛita and the other Aryan vernaculars of India. There are, we admit, breaks in the chain of our evidence, but they are not of such a character as to render the whole untrustworthy. At any rate it will be seen that the Hindví as it stands, could not have proceeded from any other known language except the Sanskrita, and this sort of negative evidence, in the absence of positive proof, has been recognized in judicature, and may with every reason be adopted in history.

It has been said that inasmuch as the earliest seats of the Bráhmans in India at the time of their advent were occupied by the aborigines, and the two races freely coalesced together, their vernaculars must have, from a very remote period, assumed a mixed character. But the Vedas give us no reason to suppose that any such extensive

admixture did take place. On the contrary it is certain that the aborigines receded as the tide of the Aryan conquerors flowed onward from the north-west, very much in the same way as the Red Indian in North America receded from the contact of the Saxon and the Celt, and they could not therefore leave behind much of their dialects to leaven the language of the aggressors. At the same time as it is impossible for two languages to come in contact without exchanging their vocables, so we find that from 5 to 10 per cent. of the vocables of the modern Aryan vernaculars of India are of non-Sanskrit or Turanian origin. Owing to the same cause the dialects of the aborigines shew a considerable stock of Sanskritic vocables, varying of course in proportion to the extent of intercourse which the different tribes who speak them had with the Bráhmans. When the aborigines had receded beyond the Kṛishṇá, their flight was checked by the sea, and they had accordingly there to make their last stand against their conquerors, and it is beyond the Kṛishṇá, therefore, that we find the descendants of those aborigines in the largest number and in full possession of their original dialects.

After having thus taken, what I trust will appear, a sufficiently consistent view of the origin of the Hindví, I shall now turn to the *Urdu*, otherwise called the *Hindustání.* Mahomedan writers inform us that the necessity of colloquial intercourse between the Moslem invaders and the natives of this country, produced a mixed dialect of which the grammar was purely Indian, but the vocables partly foreign and partly Indian. It was first principally used by the Affghan soldiery and therefore called the *Urdu* or the "camp dialect." Chiefs and nobles next took it up and it now forms the language of nearly half of the Mahomedan population of the country, the other half speaking the ordinary Hindví. This sort of fusion of the vocables of one language into another is common enough in the history of languages. To a small extent it is taking place in almost every language on earth; and instances are not wanting to shew that it has happened to a very large extent without affecting in the least the grammatical peculiarities of the recipient. In Bengal the language of the courts contains no less than 30 per cent. of Arab, Persian and other foreign words, and still it is acknowledged to be Bengálí. There is a class of books also in Bengálí which is said to be written in "Mahomedan Bengálí," and some of the Gospels have been translated into it. Its

grammar is pure Bengálí, but it contains no less than 35 per cent. of foreign words. The Persian in the same way, though an Indo-European language, has received a large accession of Semitic element from the Arabs without in the least altering its grammar. Again the Turks, though Turanian by birth, have a language which contains, almost in equal proportion, vocables of Semitic Turanian and Aryan origin. Its grammar nevertheless is purely Tartaric. According to certain missionaries quoted by Hervas* "the Araucans at one time used hardly a single word which was not Spanish, though they preserved both the grammar and the syntax of their own native speech." The English, however, offers the most remarkable instance of a language borrowing its stock of words from a variety of foreign sources without in the least altering its grammar. It is well known that in England, for three centuries after the Norman conquest, the language of court and law, and of elegance and fashion, was French, and nobody was held respectable who did not speak in it. This led to the accession of a large stock of French words into the Saxon, generally estimated at 17 or 18 per cent. and to such a change in the character of the language of the metropolis, that Chaucer doubted that his poetry would be intelligible out of London. But its grammar was left untouched. Omitting all mention of the other foreign elements, the Hebrew, Spanish, Italian, Portuguese, Bengálí, Hindustání, Malay and Chinese words to be met with in English, I may observe that it has been proved by Thommeral that of the total number of 43,566 words in Webster's dictionary, no less than 29,853 come from classical and only 13,230 from Teutonic sources. And yet the English is not a classical but a Saxon language, and that because English can be written with words entirely Anglo-Saxon, but never by Latin or French words only. The Bengálí of the Mofussil courts in the same way may have 30 per cent. of foreign words, but those words by themselves can never construct an intelligible sentence. Hence the great axiom in the science of language "that grammar is the most essential element, and therefore the ground of classification in all languages which have produced a definite grammatical articulation."† Applying this rule to the Urdu, we find that in Hindví there are several works which contain but a small admixture of foreign element. Insha Alla Khan wrote a tale in the so-called Urdu, which does not contain a

* Apud Max Müller, Science of Language, p. 76. † Max Müller, loc. cit.

single Persian or Arabic word,* and the largest extent to which Semitic element has been traced in any Urdu work does not exceed 40 or at the outside 50 out of every hundred.† While on the other hand its remaining 50 to 60 per cent. of vocables are Hindví, and its structure and grammar are entirely so, and that to such an extent that it is impossible to construct a single sentence in it without the aid of the Hindví grammar. Pedantic Mauluvis may string together endless series of adjectives and substantives and even adverbs, but they can never be put in concord without indenting on the services of Hindví verbs, Hindví inflections, Hindví case-marks, Hindví pronouns and Hindví prepositions. Nothing could be more conclusive than this ; the grammar of the Urdu is unmistakeably the same as that of the Hindví, and it must follow therefore that the Urdu is a Hindví and an Aryan dialect. A variety no doubt it is, differing from the original in having a large admixture of foreign element, but still a variety of the Hindví, as the Assamese and the Coch are varieties of the Bengalí. Englishmen who maintain that 200 per cent. of Latin and Greek do not alter the Saxon origin of their vernacular will, I am sure, readily admit my position, and if this be admitted the question as to the character in which it should be written becomes self-evident. As Sanskritic dialects the Hindví and the Urdu have undoubted claims to the Nágarí, for that alone can supply the necessary symbols properly to indicate their system of sounds. The Persian alphabet has no such symbols and therefore fails adequately to represent the phonology of the Hindví, except by the aid of a cumbrous system of diacritical marks. It is besides, notwithstanding the great facility with which it may be written, to quote the language of the learned translator of Ferishta, " the most difficult to decipher with accuracy, and the most liable to orthographical errors. In writing it the diacritical points, by which alone anything like certainty is attainable, are frequently omitted ; and in an alphabet where a dot above a letter is negative, and below the same letter is positive, who shall venture to decide in an obscure passage which is correct, or how is it possible that a person unacquainted with the true orthography of proper names can render a faithful transcript of a carelessly written original ?"‡

It is true that owing to a feeling of national pride on the part

* Ante, vol. xxl. p. 1. † Vide Appendix. ‡ Brigg's Ferishta, p. xi.

of the Mahomedan rulers of India, and partly to the inconvenience and trouble on their part of learning a foreign alphabet, the bulk of the literature of the Urdu is now written in the Persian character, which cannot now be changed, and there are certain Arabic and Persian letters, such as ق غ ع ز ذ which have not their counterparts in the Nágarí; but these facts cannot, I contend, invalidate the right of a language to the use of its own native alphabet. In importing foreign words, the rule has hitherto been to assimilate them to the language into which they are imported, and not to invent a new alphabet for their sake; the Greeks did not add to the number of their letters when they met with new letters, such as *j*, in the language of their neighbours, but represented them by their nearest equivalents in their own alphabet, and the same course should be, and in fact has hitherto been, adopted in writing the Hindví.

But whether it be proper to write the Hindví in the Nágarí or the Persian characters, certain it is, on the arguments so ably set forth by Capt. Lees, that the Roman alphabet is by no means adapted fairly to represent its system of sounds.

The question is one of great importance. It has already engaged the attention of some of the most distinguished scholars of Europe,* and it would be presumptuous on my part to dispose it off at the fag end of an article on a different subject. But as a native who feels deeply interested in the prospect of the vernaculars of his country, I cannot allow this opportunity to pass, without observing that the question has been hitherto discussed mainly, if not entirely, from an European stand-point. The benefits which European scholars, officials and missionaries are to derive by substituting the Roman characters in their writing and printing of Indian dialects, are what have been most elaborately discussed, but little consideration has been shewn as to the advantage which the natives are to derive by accepting the Roman as a substitute for their national alphabet. It is from

* It is worthy of note that Sir William Jones, Gilchrist, Wilson and some others whose names are intimately associated with schemes of Romanising, were not advocates for converting all native writing into the Roman character for natives, but for supplying a uniform plan for representing foreign words in European languages for the use of European scholars. Dr. Max Müller's system is also avowedly intended for Europeans. It is called the "Missionary Alphabet," and Christian Missionaries in foreign parts are the principal persons who are expected to benefit by it. Even Lepsius looks to Missionaries for his principal supporters.

that point, therefore, that I wish to discuss the question here. I have not the least objection to the adoption of a uniform system for the reproduction of foreign words in European langoages. On the contrary I think, for Englishmen in India, such a system is most urgently needed, as much for the sake of convenience and precision—" to avoid the chaos of caprice"—as for the researches of philologists; and I have always advocated it to the best of my humble powers.

Philologically considered, sounds are all that are of importance in a living language, and therefore it is perfectly immaterial what are the shapes of the symbols which indicate them; and if it can be shewn that one set offers advantages in writing and printing as well as in precision, over another, considerations of antiquity or national vanity ought not to stand in the way of improvement. But as the case stands, while the Roman alphabet is without question highly defective both in its arrangement and in the range of sounds which can be expressed by it, the Sanskrita has been acknowledged by competent scholars to be the most perfect of all known systems of letters, and the proposition therefore amounts to the substitution of an avowedly inferior in place of a superior alphabet. It is true that the Nágarí letters are angular, and in cursive writing must yield the palm of superiority to the Roman, but facility in writing is not the only nor the most important requirement of a good alphabet. Besides, the Roman, notwithstanding its superiority, is in this respect far from being perfect. It is utterly unsuited for the purpose of reporting public speeches, and various systems of short-hand writing have had to be devised for that work. For ordinary rapid writing, such as taking down depositions, the Bengálí and the Persian have been found in our Courts quite as good for the Bengálí and the Urdu languages as the Roman for the English, and the proposed change therefore is uncalled for, particularly when we bear in mind that the Roman letters cannot be used in writing the oriental languages without a multitude of dots and dashes and accents and commas, which completely neutralise its cursive superiority. In the standard alphabet of Lepsius, there are no less than 189 letters, of which the first *a* appears under nine disguises, produced by dots and dashes and hooks and spurs above, below and by the sides. The *d* in the same way has nine, *e* thirteen, *i* nine and *u* twelve disguises. To such an extent has this process of accentuation been carried with regard to the other letters that we

find but a few that have escaped its metamorphosing influence, and no less than 165* letters heavily loaded with excrescences. Several of those letters are Greek and others oblique and horizontal lines with diacritical marks which had never before been made to do duty for letters, except in some systems of stenography. These are surely not recommendations by way either of simplicity or precision, the two most important requirements of a good alphabet, and hence it is, that the use of the standard alphabet has proved so troublesome in the Cape Colony.† The Roman has only two diacritical marks, the dot on the *i* and the score on the *t*, and both these are unmanageable in rapid writing; to multiply them a hundred-fold, and still to expect that the alphabet would remain simple and easy of writing, is to expect what experience has already proved to be, an impossibility. Mr. J. G. Thompson of Madras once suggested "An unpointed Phonetic alphabet based upon Lepsius' Standard alphabet, but easier to read and write; less likely to be mistaken; cheaper to cast, compose, correct and distribute, and less liable to accident;" but unfortunately for his scheme, his letters were distorted and disproportioned, and so metamorphosed by hooks and loops and spurs that they could not at all be recognised as Roman. Other systems there are, but none free from diacritical marks, nor of so uniform a character as to be generally understood all over Europe. It has been said that when the Roman alphabet becomes familiar to the Indians, it will not be necessary to retain the use of the points, and by their omission, writing will be free and easy. But the proposition amounts to writing a language without vowels, and the mischief of such a course in writing generally, and in mofussil legal proceedings particularly, must be frightful to contemplate.‡ The experiment has been tried already and found to break down completely. The *Kúṭiál* Hindví is written in characters

* It is necessary to note that these are all distinct simple letters and not compound consonants and vowel marks of the Sanskritic alphabets, with which some Romanisers wish to confound them. The Sanskrita is a syllabic alphabet, and therefore every letter or combination of letters represents a complete syllable with its necessary vowel, whereas the Roman, being a literal alphabet, has to put in a separate letter for every sound both consonantal and vocalic that occurs in a syllable, and most of them when used for oriental languages have to receive their special diacritical marks above and below.

† Professor Max Müller declines to give in his adhesion to Lepsius' system.

‡ It has been said that since the Persian, a diacritical alphabet, has been so long in use, the Roman is not likely to prove more troublesome. But the object of the proposed change should be to give us a good alphabet instead of a bad one, and not to substitute a defective one by another equally bad.

closely allied to the ordinary Nágarí, but without *mátrás* or vowel marks, and in this state it is perfectly unintelligible to all except the initiated. Its use is therefore confined exclusively to drafts and cheques, and even there, for the sake of precision, the sums have to be written with such circumlocution as "rupees twenty, the double of which is forty and quadruple, eighty, and the half of which is ten and quarter, five." It is said that once a *gomástá* wrote in it from Agra to his master's family at Muttra, stating that his master was gone to Ajmere and the big ledger was wanted. The words used were

Bábu Ajmir gaye baḍi bahi bheja dijiye.

Without vowel marks and written continuously without breaks in the native fashion, the words were read—

Bábu aj mar gayá baḍi bahu Bheja dijiye.

"Master is dead, send his wife," apparently either to perform a suttee, or attend the funeral obsequies. The story may be false, but I firmly believe that the mistake it is intended to ridicule, will multiply many fold, if Indian languages be written in the Roman characters without diacritical marks.

One great argument in favour of introducing the Roman characters in India, is the uniformity of sounds which will be secured to the whole country. But the argument is based on a fallacy. Sounds are regulated by the condition of our vocal chords, and as those chords must change in their tension, elasticity and power, with every change of climate, human organs of speech cannot produce the same sounds with equal facility everywhere. Hence it is that the Roman characters have no uniformity in Europe. They differ in almost every different country. The alphabet of England is not the alphabet of France, nor is the alphabet of France that of Germany, Sweden or Russia. In each of those countries, the same letters are very differently pronounced, and the difference is greatly increased when they coalesce into words. Further, they do not retain the same sounds in all positions. Their natures and powers vary, and they become hard or soft, long or short, sounding or mute, with reference to the natures of their neighbours, and hence a constant source of difficulty presents itself in their use. This is well illustrated in the pronunciation of Englishmen and Frenchmen. The two races use the same alphabet borrowed from one common source, and yet such is the force of *genius loci* on sounds, that Englishmen find the greatest difficulty in

pronouncing French words correctly, and the Frenchman is rare who can speak English like an Englishman. It is to obviate this difficulty and secure uniformity in spelling and reading, that the "Phonetic System" has been originated in England, and Ellis, Pitman and others are trying to supersede the Roman characters altogether. This problem of phonetic reform involves questions of mathematics, physiology, and acoustics, besides those of convenience, easy writing, and economy of printing, which I cannot undertake to discuss. The system that will satisfy all the requirements of the different languages that we have to deal with, remains yet to be devised, and until that is done it would be too hasty to take up the proposition in connexion with the Indian dialects. The advocates of the phonetic system, who are making such rapid strides in England, will, ere long, do away with the present arbitrary and puzzling English orthography, and then will be the proper time to think of romanizing the Indian vernaculars. At present the want of uniformity of the Roman characters in the different countries of Europe, has led to many dissimilar and often contradictory systems of romanising; and since every one of them is more or less defective, their introduction in vernacular writing in India, where we have to deal with several distinct nationalities having many peculiar sounds of their own, cannot but prove most troublesome and vexatious. These sound, even when stereotyped by a number of diacritical marks, will still remain peculiar, and be quite as unintelligible as foreign letters to an ordinary European scholar. No language unaffected by physical causes can borrow sounds. Centuries of the Norman conquest failed to force French sounds into English organs of speech,* and it is impossible therefore to suppose that the European languages will ever receive foreign sounds for the sake of a few diacritical marks: and if they will not, where is then the uniformity for which we are to sacrifice all the Indian dialects? If the familiar English *c*, the emblem at different times of *s*

* Perhaps the real cause of the arbitrary character of the English alphabet is due to the adoption of the Roman letters by the Saxons for a Teutonic language, the sounds of which they could not represent without assuming other than the sounds which had been originally assigned to them. Hence it is that the Latin dentals *t* and *d* have become cerebrals in English, the latter having no *t* and *d* sound at all. Translating from the English, a great number of foreign names are, in the vernaculars, written with cerebral *t* and *d* when they should be represented by dentals. A ridiculous instance of this occurs in a Bengálí novel where an aping Young Bengal is made to call his father টোটারাম্ ডট্ instead of তোতারাম দত্ত.

and *k*, is to read as *ch*, and our *ch* to become something very different, it would be a delusion to talk of uniformity and universality. Admitting for the sake of argument, that foreign sounds can be naturalised in Europe, in order to familiarise them to Europeans, it would be necessary first to remove the ordinary Roman alphabet from European Primers, and supply its place by a standard one, be it of Lepsius, Max Müller or some other; and when it becomes universal in Europe, then to apply it in writing the Indian dialects, so as to render the latter easily readable by every body, and the alphabet identically the same everywhere. But as no European nation will learn 189 characters instead of 26, and that simply for the possible need of learning a foreign language, the plan cannot but appear quixotic in the extreme. Besides, some of the sounds of native languages are so peculiar, that to know them correctly, the language in which they occur must be learnt, and he who has the leisure and inclination to learn a foreign language will never find its alphabet a stumbling block. If he cannot learn the alphabet, he is never likely to learn the language. There is no system of alphabet on earth which cannot be mastered in a couple of hours, and which would not become perfectly familiar in a month; but there is not a language that I know of, which the greatest linguist could acquire with sufficient accuracy for purposes of ordinary conversation, in six months.

Much stress was laid at the last meeting upon the natives of the Peninsula being separated from each other by a number of alphabets, and rendered incapable of mutual intercourse, and on the advantage that would accrue to them by having a common alphabet. But I feel certain that the evil pointed out would not yield to the remedy proposed. We find that while in Northern India, the Hindus with their Nágarí and the Mahomedans with their Persian, meet with no difficulty in carrying on familiar intercourse, the Englishman with his Roman character common to all Europe must starve in a provincial hotel across the channel, if he knew not that bread in French was *pain*. What is wanted therefore is a common language, and not a common alphabet. The latter even when attained, can, at best, but gratify a fancy—that of ideal uniformity, while the former would be a positive good, and come home to the business and bosom of all who attain it.

No discussion on the value of an alphabet in the present day can be complete without reference to its adaptability to printing. I wish

therefore to say a few words on the subject, though I claim no especial knowledge of that art. It has been repeatedly said that the Roman letters occupy less space, and are more easily composed, more lasting, less liable to breakage, and consequently more economical than any other known class of letters, and if these could be proved to be facts, a strong argument no doubt would be made in its favour. But I am afraid the advocates of the Roman alphabet have come to their conclusion, without making sufficient enquiry. I have been assured by several respectable printers, and I know from personal knowledge, that the cost of composing in Sanskrita and Bengálí types is much lower than that of setting up Roman letters; and that the lasting quality of the former compared to that of the latter, is as 2 to 1. The Rev. C. B. Lewis of the Baptist Mission Press, assures me that "the English type soonest shows signs of wearing out. This arises from the more delicate outline of a nicely cut Roman and Italic type—and especially from the seriffe of the letters *i. e.* the fine line at the end of each stroke of b p u s. When this line is worn off, the Roman letter, even if otherwise good, has a very ancient decayed look." As regards breakage, the Roman type has great advantage over the Nágarí, but this advantage is entirely negatived by its wearing out much faster than the latter. On the whole therefore the balance of advantage is in favour of the oriental type and against the Roman. Nor is this compensated by any saving of space through the slimness of the Roman letters. I have a volume by me, containing a prayer by the Armenían patriarch Saint Nersetis Clajensis, translated into thirty-three different languages, and also separate pamphlets containing translations of the same into Sanskrita, Bengálí and Burmese. The translations in German, Hebrew, Turkish, Arabic, Persian, Syriac, Chaldee, Ethiopic, Malayan, Burmese and Chinese are given in large type: the rest in type very nearly alike. These books therefore offer valuable data* for ascertaining the extent of space which a given quantity of matter takes up in different type, and on examining them, I find that the Roman is inferior to the Greek, Sanskrita,

* The following list shews the number of pages which the prayer takes up in the different languages. Armenian 13 pages, Greek 12, Latin 13, Italian 15, French 13, Spanish 14, Lusitanian 16, German 15, Dutch 14, Swedish 14, Danish 13, Icelandic 13, Greenlandic 14, English 14, Hibernian 14, Celtic 16, Wallachian 14, Russian 14, Polish 15, Illyrian 13, Servian 13, Hungarian 14, Iberiac 22, Turkish 13, Persian 16, Arabic 15, Hebrew 14, Syriac 17, Chaldee, 31, Chinese 25, Æthiopic 23, Malayan 20, Malayalim 21, Burmese 12, Sanskrita 12, Bengálí 12.

Bengálí and Burmese, and that if the Semitic letters be reduced to the same face, as that of the Long Primer or the Bourgeois, they would far surpass the Roman in compactness. No doubt the natives of this country, accustomed to manuscripts for ages, are fond of large types, as were the natives of Europe two or three centuries ago; but already the people of Bengal have taken to Bourgeois and Brevier in Bengálí, and the same will soon follow in the Nágarí and the Persian. It is possible that Bengali types, as generally used, with the vowel marks cast in separate pieces and the lines leaded out, take, face for face, a little more space than the Roman, but while this disadvantage may be easily obviated by mechanical means, the superiority of the Roman on this account is so small, that it cannot at all make up for the defects which have been set forth above.

As a question of policy it would not be proper for our present Government—the most liberal and tolerant that India ever had—to force the introduction of the Roman character into our schools and courts. One great cause of complaint in Poland, Hungary, Schleswig-Holstein and Austrian Italy is the attempt on the part of the conquerors to force their languages on the subject races, by introducing them into the courts of those countries, and a similar course in India, even if confined to the alphabet alone, will, I apprehend, prove a like source of discontent. The Hindus regard their alphabet to be of divine origin (Deva Nágarí) and a gift from the Godhead. With it is associated their religion, their literature, and their ancient glory. To touch it is to meddle with their religion, their past greatness and their cherished recollections. In the case of Austria, Russia and Denmark there is some advantage in prospect. It is a prerogative of Government and a source of power to use its own mother-tongue in the courts established by it, though the main object of dispensation of even-handed justice may not thereby be fully attained. The people of India could understand the object of introducing the English language into our courts, though they would feel the injustice of sacrificing the interest of the million for the convenience of a few officials. But they cannot but think it a gratuitous and vexatious interference with their language, to force upon them an alphabet which is avowedly unfit to represent its system of phonology, and that merely for the sake of an idea. Give them what is good for them, and they will receive it with thankfulness. Offer them the English language and

they will learn it with all their might and main, for they know it enables them to have intercourse with their governors, and opens the way to wealth and power ; but they cannot perceive that changing their own ancient and superior alphabet for a defective one, can do them any good, and they will have none of it. The interference of Government in such a case cannot but prove mischievous, for were the Government even to confine its patronage of the Latin character to printing vernacular books in it and giving them a wide circulation, it would still displease its subjects, for, preternaturally suspicious as they are, they cannot but look upon such a measure as an act of antagonism against their ancient literature, while it will divert to a useless channel a portion of the limited resources of the education department. The Germans are more highly civilized and more intelligent than any modern Asiatic race, and yet they have, up to this time, notwithstanding the experience of centuries, failed to appreciate the superiority of the slim Roman to the cumbrous German type. The Hindus cannot but prove infinitely more obtuse. It has been said that a patriotic feeling for their ancient characters prevents the German from adopting the Roman letters. If so, (and most probably it is so,) how much stronger must that feeling be in the Hindus in favour of the alphabet in which is preserved their ancient and much revered Vedas, and which is the repository of all their correspondence, accounts and title-deeds. Teach the Roman character in our vernacular village schools, and you will teach what the pupils will be most anxious to unlearn, for it cannot help them at all in the affairs of their lives for centuries to come, nor keep them *au courant* with the rest of their countrymen. For my part I believe, with Sir Erskine Perry, that " were a legislative enactment to insist, even under penalty of death, upon the use of the Roman character, it could not convert our banias' accounts to round German text."

Grand no doubt is the idea of a universal alphabet and grander still is that of a universal language, but the curse of Babel is still upon us, and neither the one nor the other is practicable.

POSTSCRIPT.

I take this opportunity to express my entire concurrence in the opinion expressed by Capt. Lees, on the reading of my paper in August last, as to the number of non-Hindví or foreign words trace-

able in the Urdu. My estimate of 40 to 50 out of every hundred was founded upon the ordinary run of Urdu books, and is not applicable to the style of some of the works patronised by the late effete courts of Delhi and Lucknow. The percentage of foreign words in those books, is, I readily admit, much higher. But at the same time it will be seen from the subjoined extract from the *Sarúr e Sultáni*, the book to which Capt. Lees particularly drew my attention, that it is not so excessively great as to affect much my general conclusion. I add an extract from the *Fisháneh Ajáëb* which also belongs to the highly Persianised class of writings of the *Sarúr e Sultáni*, and the relative proportion of Hindví and foreign elements in it appears to be as 62 to 38; in the first named book it is 57 to 38, *i. e.* 60 and 64 per cent. respectively. My quotations are, I must acknowledge, taken at random, and there are passages in both the works which are much more Persianised, while there are others which are less so; but on the whole they may be, I believe, taken as fair average specimens, as the facts they yield correspond very closely with the results of my enumeration and classification of the words of several pages of each of the two works. To be exact, it would be necessary to count and classify all the words that occur in them, and even then no satisfactory conclusion could be drawn, owing as much to my own limited knowledge of the Semitic languages as to the doubtful origin of many of the words. It is even likely that my division of the Hindví and foreign words in the short extracts given below will be questioned, but that will not, I believe, alter my position, for I do not depend so much upon the relative proportion of the two elements of the Urdu, as upon its structure and grammar, which I contend is purely Hindví. The verbs *hai, thá huá, geyá, dekhe, sunke, &c.*, in the extracts are all without exception Hindví; the case affixes *ke, ká, ki, son, men, &c.*, are likewise Hindví and so are the pronouns and prepositions, *apne, uoh, se, tak, kiá, &c* Take away those case-affixes, verbs and prepositions, and the sentences will crumble down and cease to be sentences. It would not be elegant to say in English "the bouleversing of the escritoire created quite a sensation in the boudoir of the Mademoiselle;" but similar sentences are not rare in first class periodicals and novels, and they afford a fair example of what the Urdu is. Their construction and grammar are English, and though we may call them Galli

cised we cannot say they are French. No Frenchman would for a moment recognise them as such. English rhetoricians, no doubt and very justly, condemn them, but still they admit them to be English and quote them as specimens of English. Following them, we may call the Urdu, *Persianised* Hindví, but still Hindví and not Persian. In the four Mahomedan Bengálí books, from which extracts are given below, the number of foreign words appear to be quite as large as in the ordinary run of Urdu books, and yet those books are described by their authors to be Bengálí, and translated from the Persian and Urdu expressly for the people of Bengal. Virtually their language is as much the Urdu of Bengal, or Bengálí Urdu, as the Urdu is the Hindví Urdu, or the Urdu of the North-West. If they be taken for distinct languages, I see no reason why the anglicised Hindví in which Englishmen in India say,

E 1	E 2	H 1	E 3	E 4	H 2
" *bearer*	*couchká*	*sámne*	*álmárime*	*pantaloon*	*rakkho*,"

a new language. In it we find no less than four European and only two Hindví words. Similarly the Bengali of our courts, which contains twenty per cent. of English words, would have a fair claim to a distinct rank. The language of Young Bengal again is a patchwork of English nouns and Bengálí verbs, and yet nobody has thought of calling it a distinct language. And if they are not distinct languages, but corruptions and dialectic varieties of one language, the Urdu can hold no higher position.

The colloquial Urdu of the masses contains a smaller admixture of foreign words than the written Urdu, and Capt. Lees is of opinion that it is a distinct dialect independent of the Urdu of our books; to it he applies the term Hindustání. But the principle of this subdivision is open to grave objection Pressed to its legitimate end, it would justify our dividing every living language into not only two distinct dialects, the written and the colloquial, but to as many dialects as there are orders and ranks of people.

Extract from the Surúr Sultáni, p. 11.

F 5 F4 H 4 H 3 H 2 H 1 F 3 F 2 F 1

جمشید اولوالعزم طبیعت کا تیز تھا ، لوھے کو گلایا زرہ جوشن

H 13 H 12 H 11 H 10 H 9 F 7 H 8 F 6 H 7 H 6 H 5

بنایا ریشمي کپڑا ایجاد کیا رعیت کو شاد کیا جس جگھہ زمین

F 12 H 18 H 17 F 11 H 16 F 10 H 15 H 14 F 9 F 8

قابل زراعت دیکھي پانيکا چشمه پایا خلق کو بسایا دیو محکوم

F 16 H 23 H 22 H 21 F 15 F 14 F 13 H 20 H 19

تھے اونسے عمارت مستحکم ایوان محل سراپخته بنوائي ادمیون کو

F 22 F 21 H 27 H 26 F 20 F 19 F 18 H 25 H 24 F 17

ترکیب سکھائي تخت مرصع جواهر نگار تیار هوا شروع سال کا

F 23 H 36 H 35 H 34 H 33 H 32 H 31 H 30 H 29 H 28

نو روز نام هوا جشن کا سرانجام هوا جب تخت پر جلوس

H 45 H 44 H 43 H 42 H 41 F 25 H 40 H 39 F 24 H 38 H 37

کرے جهانکا عزم هوتا دیو بروئي هوا تخت اوڑا لیجاتے هاتهون

F 27 H 50 F 26 H 49 H 48 H 47 H 46

هاته پونهچاتے سات سی برس سلطنت کي مگر فردوسي درین

F 29 F 28 H 51

سال هنقصد همین رفت کار ندیدند مرکه اندران روزگار * یکایك بادۀ نخوت

H 54 F 35 H 53 F 34 F 33 F 32 H 52 F 31 F 30

کا دماغ مین جوش هوا دفعة خود فراموش هوا عبدیت بهولا

57 F 38 F 37 H 56 H 55 F 36

معبودي کا دعوي کیا شیطان نے رسوا کیا

Extract from the Fisáneh Ajáeb, p. 7.

F 6 F 5 H 6 H 5 H 4 F 4 H 3 H 2 F 3 H 1 F 2 F 1

سبحان الله و بحمده عجب شهر گلذار هی * هر گلي کوچه دلچسپ

H 17 F 9 H 16 H 15 F 8 H 14 H 13 H 12 F 7 H 11 H 10 H 9 H 8 H 7

باغ و بهار هی * هرشخص اپنے طور پر قطعدار هی * دورویه بازار

F 13 H 22 H 21 F 12 F 11 H 20 H 19 H 18 H 18

کس اندازکا هی * هر دوکان مین سرمایهٔ ناز و نیاز کا هی * هر چند

F 15 H 30 H 29 F 14 H 28 H 27 H 26 H 25 H 24 H 31

هر محلے مین جهان کا ساز و سامان مهیا هی * پر اکبري

H 38 F 19 H 37 H 39 F 18 F 17 H 35 H 34 H 33 F 16 H 32 H 32 H 31

دروازیسے چلو جاے اور پکے پل تك که صراط مستقیم هی۔ کیا جلسا هی

H 41 F 26 H 40 F 25 F 24 F 23 F 22 F 21 H 39 F 20

نان بائي خوش سلیقه شیر مال کباب نان نهاري جهان کي نعمت اس

H 47 F 31 F 30 H 45 F 29 H 44 H 43 F 28 H 47 F 27

ابداریکي جسکي بو باس سے دل طاقت پائے دماغ معطر هو جاے *

* Persian Quotation from Ferdusi.

H 54 H 53 F 34 H 52 H 51 F 33 H 50 H 49 H 48 F 33 F 32
فرستد گذرے تو سونگھے • کیسا ھی سیر ھو ذرہ تدبیر ھو دیکھے سے

H 56 H55
بھوک لگ آے •

The following is an extract from the *Iblisnámeh* (p. 1.) The total number of words in it is 58, of which 35 are Bengálí and 23 foreign. Its grammar is pure Bengálí.

F 1 F 2 F 3 B 1 B 2 F 4 B 3 B 4 F 5 B 5 B 6
পহেলাতে বেছমেল্লা, শুরু করি নামে আল্লা, সে নামে ছেপ্ত শুন ২ ভাই।

F 6 F 7 B 7 F 8 F 9 B 8 B 9 B 10 B 11 B 12
আমেল ফাজেল তারে, এরবিতে তরজমা করে, মুর্খলোকে তাহা বোঝেনাই ॥

B 13 B 14 F 10 B 15 B 16 B 17 B 18 B 19 B 20 B 21
শুন ভাই বেরাদরি, একারণে বাঙ্গালা করি. লেখি আমি বুঝিবার তরে।

F 11 F 12 B 22 B 23 B 24 B 25 F 13 F 14 B 26 B 27
আরবি ফারছির তরে, কেহুনা বুঝিতে পারে, সোকর ছেফত বলে কারে ॥

F 15 F 16 B 28 F 16 F 17 F 18 F 19 B 29 B 30 F 20
আল্লার ছেফত যত, থোড়া এরছা হকিকত, কেতাব মত করিজে বয়ান।

F 21 F 22 B 31 B 32 B 33 B 34 B 35 F 23
মুরসিদের হুকুমমতে, অবুঝাকে বুঝাইতে, পুথি করি বাঙ্গালা জোবান ॥

The following is from the *Kiámatnámeh* (p. 2). The number of Bengálí words in it is 36, that of foreign 16.

B 1 B 2 F 1 B 3 F 2 B 4 F 3 F 4 B 5 F 5
নাজানি কেমন ভেদ আছে কেয়ামতে। কি রুপে হাসর খাড়া হবে আখে-

B 6 F 6 B 7 B 8 B 9 B 10 B 11 B 12 B 13 B 14
রেতে॥ বাঙ্গালা জবানে যদি কেহ কহে ভাই। আপনা চক্ষেতে দেখ মনকে

B 15 F 7 F 8 B 16 B 17 B 18 F 9 B 19 B 20 B 21
বুঝাই॥ এরছাই তালাস লোগ করে যেথাসেথা। কাহেনি করিয়া কেহ না

B 22 F 10 B 23 B 24 F 11 F 12 B 25 B 26 B 27
করে কবিতা॥ জাহানে অনেক আছে লায়েক কাবেল। বাঙ্গালা করিতে কার

B 28 F 13 F 14 B 29 F 15 B 30 B 31 B 32 B 33 B 34
নাহি ফিরে দেল॥ লোকের খাহেস দেখে ভাবে মনেমনে। কেমনে হইবে

B 35 B 36 F 16
পুথি বাঙ্গালা জবানে॥

The *Chahárdurvish*, p. 2, which has an admixture of 16 foreign in every 40 Bengali words, proclaims itself to be current Bengálí, translated into it in order that it may be easily understood by the Bengálí public.

চলিত বাঙ্গলায় তাই করিনু তৈয়ার। সকলে বুঝিবে ভাই কারণ ইহার ॥

Kázi Safí-uddín, in his preface to the *Kilas ul ambiá*, says

এহাতে নবি ও পয়গম্বরানের কেচ্ছা কোরান সরিফ ও হদিছ হইতে ছাবেত আছে, এক্ষণে এহাকে বাঙ্গলা ভাষায় তরজমা করাইয়া বহুত খরচ করিয়া ছাপাইতেছি।

"It contains accounts of prophets and messengers according to the holy Koran and the Hadith, and now I, having got it translated into Bengálí, print it at a great cost."

The language of the translator, Reza-ullah, will be illustrated by the following extract, in which we have 17 foreign for every 24 Bengálí words.

B 1 F 1 B 2 B 3 F 2 F 3 F 4 B 4 B 5

শুন হো মোমিন ভাই করিয়া খেয়াল। আখেরে সাফৎ জাঁর হইবে

F 5 F 6 F 7 F 8 F 9 F 10 F 11 B 6 B 7

নেহাল॥ মহাম্মদ মোস্তা নবি আলায় হেস্ছালাম। পয়গম্বরী হৈল তাঁর

B 8 F 12 F 13 F 14 B 9 B 10 B 11 B 12 F 15 B 13

উপরে তামাম॥ নবুওত দরিয়াতে সেই মোতি ভারী। লেখিতে ছেফত তাঁর

B 14 B 15 B 16 B 17 F 16 B 18 B 19 B 20 B 21 B 22

আমি কিবা পারি। আপনা নূরেতে জারে আপে নিরঞ্জনে। প্রথমে করিয়া

F 17 B 23 B 24

পয়দা রাখিল গোপনে ॥

EMENDATIONS.

P. 498, line 4. For "*i*, *u* and *ri*" read "*i*, *u* and neuter nouns in *ri*."

P. 498 line 7. For "singular number of words ending in other than *a* is as," read "plural number is *bhyas*."

The Mines of Khetree in Rajpootana.—*By Col.* J. C. Brooke.

[*Received 6th April, 1864.—Read 4th May, 1864.*]

Khetree is situated at the foot of the Arabullee range of hills, which, running south-west and north-east, divides Rajpootana into two portions, separating the fertile eastern states from the more desert western ones. The Arabullee, commencing south of Oodeypore, and touching the western shores of the fairy lakes of that capital, supports the table-land of Meywar, till, opening into numerous spurs, among which dwell the brave and faithful Mhairs, perhaps the only race in India who have accepted the British rule in full and unreserved confidence, it passes Ajmere. From Ajmere the Arabullee tends a little more to the east, dividing Jeypore proper from Shekhawattee, and at the extreme north eastern corner of the latter district, the Arabullee meets the Tonrawattee and Ulwar ranges of hills, the direction of which is generally north and south.

At this extreme corner, some lofty spurs occur, on one of which the hill fortress of Khetree above the town of that name, Pl. I., and on another, that of Bagore are placed. The spurs of these hills run south east and north west, at right angles to the main range, which has a south west and north east direction. In these spurs are rich mines of Iron, Copper, Alum and Cobalt, and perhaps other minerals exist, which a careful examination of the rocks may bring to light. Attention must soon be directed to this region, in the prosecution of the search for coal,* which the extension of railways will necessitate, and to judge from the variety and character of the rocks, there are few places deserving of more careful examination than Khetree.

The little state of Khetree is an allodial Fief belonging to a Rajah, but under the sovereignty of Jeypore, to which it pays a quit rent for some of its pergunnahs, of Rs. 80,000 a year. Khetree enjoys a net revenue of about three lakhs a year, of which, however, very little is the produce of the mines.

The town of Khetree contains about 1000 or 1500 houses, among which are those of a few wealthy families, the most notable of whom has constructed a large and magnificent temple at the entrance of the

* No published notice of the Geology of Rajpootana with which we are acquainted, mentions the occurrence of the coal-bearing rocks in Rajpootana.—Eds.

town. The founder of it amassed his wealth in the situation of Commissariat Gomashtah at Cawnpore, on a small salary. Generally speaking, the people of Khetree are poor, partly owing to the lawless character of the Shekhawattee population, which prevents much trade or commercial enterprize, and partly to the oppressions of the various Kamdars and managers during the long minority of the present Rajah.

Amongst the poorest of the Khetree population are the miners. These are of two races, Hindoos and Mussulmans. The Hindoos work the alum and sulphate of copper works, whilst the Mussulmans confine themselves to the ores which require smelting.

The mines, as before remarked, are situated in the small ranges of hills near Khetree. One of the largest of those now worked, though not the most profitable, is the "*Koolhán*" mine, and a description of the process, carried on at this, will suffice as an example of the whole.

The approach to the *Koolhán* mine, about half a mile from the town, is over hills of clay slate, through which granite, iron stone and other rocks have forced themselves. Along the same spur, which runs from Khetree to Singhana, are several other copper mines, intermixed with sulphate of copper and alum mines, which predominate as Singhana is approached.

The entrance to the *Koolhán* mine is 300 feet above the plain below. The mine descends at an angle of about 60° in a zig-zag, but in a very irregular course, and branches off in various directions. Sometimes, for ten or twenty yards, it is only just sufficient to admit the recumbent body of a man, and at others, opens out into considerable chambers, according to the richness of the rock, from which the ore has been not fairly "*worked*," but one may say, "*stolen*." The richest ore, as frequently happens, is at the greatest depth; but there the mine is generally choked with water. This is the great difficulty the miners experience. Their only means of getting rid of the water, in consequence of the tortuous course of the mine, is to form a chain of human beings from the mouth of the mine to the water, along which ghurrahs are passed by hand, filled with water and the rocky debris, which neglect has allowed to accumulate in the mine. This is a slow and expensive process. In one branch of the *Koolhán mine*, no less than 27 people were required for the purpose, and as each occupied as nearly as could be estimated, 8 feet, it gave 216 feet as the depth of the working. The labour of emptying is continued day and night. On

Nº 1. Town of Khetree with Hill Fort 1270 feet high and [illegible] above the sea

this occasion, upwards of a month had been expended in this primitive and inefficient process, and the cost was about 200 Rupees. To clear the whole mine properly would require about Rs. 2,000, which is a sum, those employed in the trade could ill-afford to lay out.

The richest mines in Khetree are lying useless from being thus choked. There is one especially, the ore from which the miners confidently affirm contains 75 per cent. of pure metal. It is situated near a running stream, and various traders have expended large sums to clear this mine, but hitherto without result.

At Baghore, a fortified hill about 200 feet higher than Khetree, are other mines of copper intermixed with cobalt, the latter alternating in thin layers with the copper.

The copper mines are owned by the miners themselves, whose ancestors discovered them in former times. The larger are managed by a punchayet, on behalf of the mining community, who are descended from the ancient discoverers. Some of the smaller mines are owned by traders, who have bought them up, either from the original discoverers, or else gradually from their descendants, as these have become involved in difficulties, and have pawned or made over their shares to the traders; who pander, for their own interests, to the unthriftiness for which all such men are noted. The larger mines do not appear to have shared this fate.

Each year, after the rainy season the various branches of each mine are put up to "auction" by the punchayet. The *Koolhán* mine has six or seven branches. The miners themselves are the bidders. Each branch of the Koolhan mine sells for from Rs. 50 to 100 a year, and the whole mine fetches from Rs. 400 to Rs. 600, which is a small sum, considering the rich treasures existing in it.

Each branch of the mine is jealously watched by the miner who purchases it, and who hires other miners as laborers on two annas per diem. Were the mine not guarded, these laborers might purloin the ore and sell it.

The miners work in gangs, and a party of eight men, starting in the morning at about 8 o'clock, will bring back from $2\frac{1}{2}$ to 3 maunds of ore by the evening. The ore is brought in small baskets, weighing about 6lbs. each, and is then put up to auction, in the same manner as is done with the ore obtained from the mines still in the hands of the original proprietors, or the traders. The auction takes place at

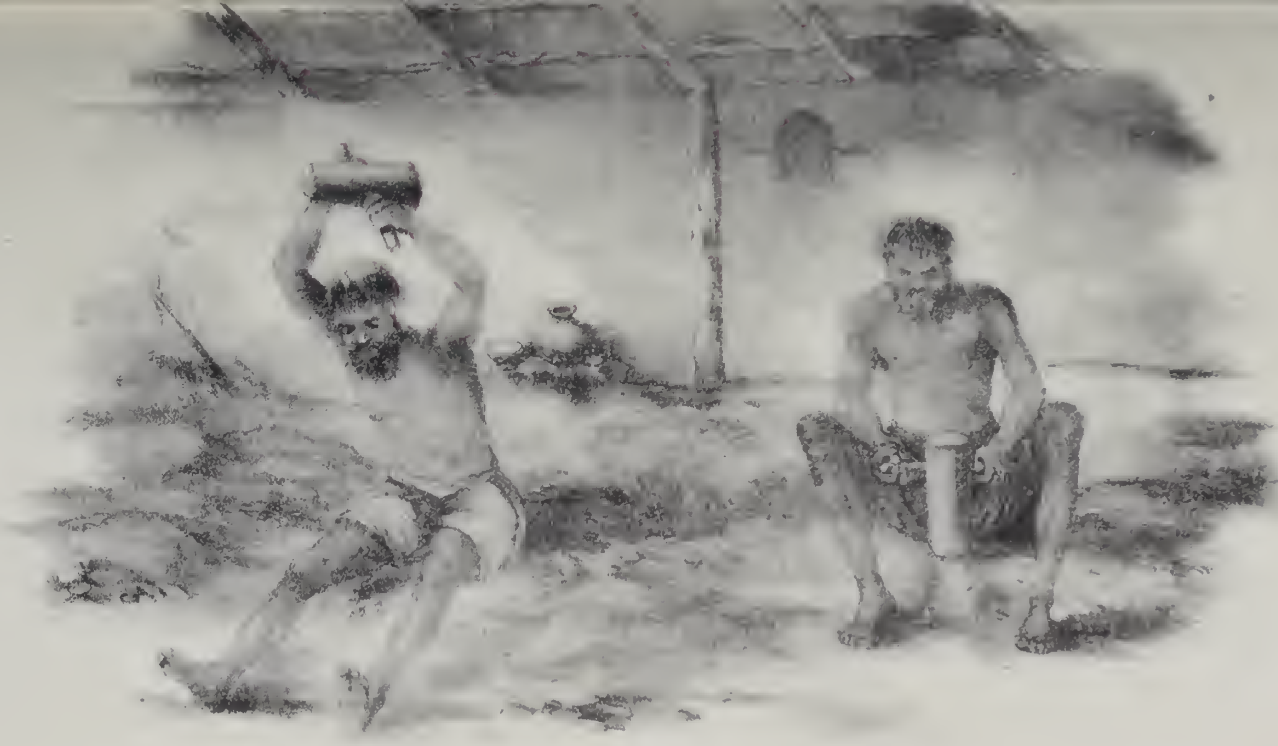
the town of Khetree itself, and furnishes a scene of much excitement. The purchasers are Mussulman Bhoras, who conduct all the subsequent operations; and here the interest of the miners entirely ceases in the produce of the mines. If the ore is black sulphuret of the first class, it will fetch as much as Rs. 10 per maund of $26\frac{1}{2}$ seers; but if good pyrites, perhaps Rs. 4 or 5 a maund. The pyrites is much the most plentiful ore, but there are several poorer ores fetching as low as Rupee 1 a maund.

The Borah having concluded his purchase, employs a man with a small hammer, who receives Rs. 3 per month, to separate the ore from the schistose rock and quartz, (with which it is intermingled in about equal quantities), and to break it into small pieces.

The ore has now to be finely powdered. This is done by men using 'Ghuns' or heavy hammers, weighing from 32 to 34 pounds each. The hammer is lifted with both hands, one on either side of the hammer head and brought down with great force on a small heap of the ore, raked into place with the toes, that never failing substitute for the hand among natives: as this is the most laborious operation in the whole process, only the strongest men are employed. Pl. II. The ore has to undergo the hammering three times before it is fine enough for the roasting process. A Ghun man on coming to his work very early in the cool of the morning has five maunds of ore weighed out to him, this is his proper quantity for a day's work, and is as much as can be supplied daily by the coarse breaker. Preparing this properly, gives the Ghun laborer six hours of hard unremitting work, and his wages are proportionately high, viz., five rupees a month.

The ore, having been reduced to a proper state, is next mixed with cow-dung, and made into rolls about four inches long, which are first dried in the sun, and then roasted in the open air, in a fire of cow-dung cakes. This is an inexpensive process, costing only a few annas for cakes to roast five maunds of ore.

The ore is now ready for the smelting furnace. For this, Koomhars or potters are employed. The potter builds and works his own furnace, and supplies the bellows; in fact extracts the metal. Four people, one of whom may be a child 12 or 14 years old, are required for each furnace. They receive collectively Rs. 11 a month. The furnace is about $3\frac{1}{2}$ feet high and 12 inches in diameter, built of pieces of slag



No. 2. Pounders of Ore with "ghuns" weighing 32 to 34 lbs each.

No. 3. Koomhar making a smelting Furnace for Copper Ore

cemented with clay in a most primitive manner Pl. III.; and the nozzles of the bellows are built up in it. The nozzles are earthen tubes which are thickest at the furnace end, and at the top of the thick part is a small air hole, usually closed with a piece of wet rag, but opened now and then to clear the tubes. The other end of the tube is fixed to the bellows bag. The bellows valve is formed by two sticks at the mouth, which are opened when the bag is raised for the admission of air, and closed when the bellows are pressed down with force by the bellows men, who use both hands for the purpose. The upper part of the furnace is formed with rings of fire clay, about 10 inches deep. The bellows are worked on three sides, while on the fourth is the opening to the furnace, in which a plate of fire clay is placed, at the lower part of which is a hole for stirring the molten metal and allowing it to flow out. Pl. IV.

The furnace is prepared daily, each smelting occupying about 12 to 14 hours. After the furnace has been lit and well heated, the roasted ore is gradually introduced, alternately with charcoal and the flux which is called "Reet." This is the refuse from old iron furnaces, of which hills of debris still remain, the iron having been worked for ages before the copper ore was discovered. At each operation, five maunds of roasted ore is gradually introduced into the furnace; this requires an equal amount of the "Reet," and four maunds of charcoal to smelt it.

The produce of course varies with the description of ore. The poorest kind, which is sold for eight annas a Khetree maund, and the value of which is doubled by the cleaning and crushing, will produce, at the lowest rate, twenty seers of unrefined copper, which in refining is again reduced one-half, leaving only ten seers. This would make about 303 Tukkas in copper pice.

The expenses may be calculated as follows:—

5 maunds ore, ...	Rs.	5	0	0
Hammer-men, ...	...	0	5	0
4 maunds charcoal at 31 maunds per 12 Rs.	...	1	4	0
5 maunds flux at 20 maunds per rupee,	...	0	4	0
Koomhars for smelting $\frac{11}{30}$, ...	...	0	6	0
Refining, ...	...	0	8	0
Total,	...	7	11	0

Raj share $\frac{1}{4}$ of 9 rupees,

The produce will be ten seers as before stated or 303 Tukkas, and deducting $\frac{1}{4}$th, the share of the Raj, &c., 228 Tukkas worth about Rs. 9 will be left. If we take from this the expenses Rs. 7-11, the net profit will be Rs. 1-5 per diem, but allowing for extras, roasting not charged, etc. we may reckon it at 1 Rupee per diem, when the ore is poor.

There is sometimes a loss in the smelting operations, but the Bohrahs take their chance of this, the gain sometimes being very considerable. On an average it may be reckoned at about 2 rupees on each smelting.

After the ore has been smelted, the metal has to be refined, and the sulphur driven off. This is done by passing a very strong current of heated air over the liquid mass, and constantly skimming it. Pl. V. To obtain the blast a single bellows is used, which is worked by one man opening and drawing it up, and two others pressing it forcibly down with their feet, placing their whole weight on the bellows, and maintaining their balance by means of ropes fastened to the roof of the building.

About one maund is refined at a time, which produces about 20 to 25 seers of good copper. The refining is contracted for at 8 annas the maund. The process requires about three hours, and the men are paid $1\frac{1}{2}$ annas per diem each. When the pot in which the refining has been conducted is ready, the ore is poured into small earthen troughs prepared on the ground for the purpose, and is then taken to the mint for weighment and duty.

The measure at the Khetree mint is the Shahjehanee maund, equal to $36\frac{1}{2}$ seers of the Jeypore maund, but only to 30 seers of the Khetree maund. In the Shahjehanee maund are 1,212 Tukkas or 2,424 pice. Of this, the Khetree Rajah takes 269 Tukkas as his share. Twenty-two Tukkas go to the coiners for their trouble in converting the copper into pice ; nine to the Darogah of the mint ; two to the weighmen, and four to caste charities ; total 306, leaving 906 to the smelter. Twenty-six Tukkas at Khetree sell for the rupee, whereas at Jeypore usually only twenty Tukkas can be procured for the same. The value of 906 Tukkas at Khetree would be Rs. 34-12 nearly.

In some of the mines, a sulphuret of cobalt is found in thin layers, between the masses of copper ore. No great quantity of this is pro-

No. 4. Copper Ore smelting furnace in play.

... refining furnace with troughs for metal.

uced however, not above 200 lbs. per month in any particular mine. t is merely pounded fine, and exported, and finds its way all over ndia. It is largely used in enamelling, forming the beautiful blue namels which native proficients in this art produce. Its price at Khetree itself is Rs. 50 per Jeypore maund of 53 lbs. the Raj share eing one-fifth or 10 Rs. per Jeypore maund.

The above is a short description of the rude processes employed in melting the rich copper ores found in Khetree. The miners are retchedly poor and ignorant: the mines are choked with rubbish, nd worked without system, so that the more valuable ores are not eached: the ore only passes through the furnace once. The metal hen separated is the only part kept, but the layer next above the egulus, which is also rich in metal, is thrown away: of this, vast heaps r rather hills exist, both at Khetree and Singhana, and the present urnaces are on these mounds, from which a little enterprize and knowedge would extract a large produce.

There is no means of knowing what the produce of the copper mines ould be, if worked on European principles, or whether the fuel, hich suffices for the insignificant native works would not soon be xhausted. The fuel is charcoal from the 'phog' plant. It grows eely all over the neighbouring sandy deserts. The 'phog,' on which amels feed freely, is a low succulent plant about a foot and a half high, ut the roots of which swell out to a large size and make excellent fuel or all purposes.

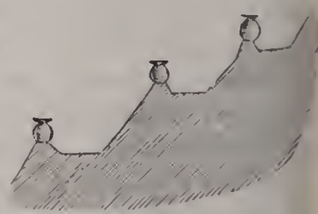
Besides the copper mines at Khetree, the alum mines are deserving f attention. They occur indiscriminately with the former, but the orkings are not usually so deep. When the alum and copper ore are n the same mine, the alum and the resultant sulphate of copper, are ontracted for, separately from the regular copper ores. The miners ho work in the alum mines are Hindoos, whilst those in the copper nines are Mussulmans. Seventy-two houses are employed in the wenty alum works, which are in full operation at Khetree; about ouble the number are in work at Singhana. In each establishment bout six men are employed, on wages varying from Rs. 2 to Rs. 4 month; the latter being for able bodied men, who can work from o'clock in the morning till a couple of hours after sunset.

Two men go in the morning to the pits, and bring about seven naunds of shale during the course of the day, whilst a couple of others

are employed in breaking it up into small pieces. The broken shale mixed with the crust from the refuse heap, (hereafter alluded to,) is then put into gurrahs till they are half full. The gurrahs previously arranged along the edges of the heap are then filled with water. The whole is turned and mixed three or four times a day by one of the men with a bit of broken gurrah in his hand, so as to expose every part.

At the end of 24 hours, the water, which now holds a considerable quantity of the sulphates in solution, is poured off into other gurrahs, holding a fresh portion of shale, and surface refuse, whilst fresh water is added to the first shale. The operation is repeated a third time with the shale, after which, the latter having parted with a considerable quantity of its sulphates, though not by any means with the whole, (as the shale was at first only coarsely broken and not pounded,) is thrown along the slope of the refuse heap, which is purposely kept smooth and hard.

The refuse heaps Plates VI, VII, are formed as truncated cones and are very regularly and evenly kept; so much so, that they appear as if prepared and kept smooth by a spade. They rise in successive layers to a considerable height, each being less than that below it, by the breadth of terrace left at its base; this terrace is bordered by a low ridge for the gurrahs containing the shale, and which give to the whole so peculiar an appearance. The ridge also serves to retain any water that may be spilt on the terrace, and any rain water, which sinking into the heap, carries portions of the sulphates to the surface slopes, where efflorescence takes place as the heap dries. It is this surface shale which is mixed with the fresh shale from the mines in equal quantities, to form the material with which the gurrahs are charged. The section of a pile would be something like the accompanying figure. Year after year the heap increases by the deposition of half exhausted shale, and many of the existing heaps are formed of the refuse materal accumulated by many generations.



It has been already said that each charge of shale is exposed to three changes of water. The water on the other hand is changed in the gurrahs, till it has taken up, the sulphates from seven different

No. 6. Alum and Sulphate of Copper works shewing refuse heaps.

No. 7. Alum and Sulphate of Copper works shewing refuse heaps (another view

gurrahs. It is now of a thick dirty bluish green colour, and is taken to the boiling house, Plate VIII., where it is boiled in common gurrahs over a fire in choolas, something like those used in kitchen ranges. When the liquor is sufficiently concentrated to string, it is left to cool, and thin sticks being introduced, the sulphate of copper at once separates and crystallizes on them. The mother liquor is then drained off into other gurrahs, as it still contains in solution, a considerable quantity of the sulphate of copper as well as of alumina: it is again boiled down, and treated with nitrate of potash, which causes alum to crystallize at the bottom of the vessel.

The residual liquor still contains a quantity of both sulphates, and is allowed to evaporate in broken gurrahs in the sun, when a considerable quantity of impure and imperfectly crystallized sulphate of copper and alum is left, taking the shape of the bottom of the vessel.

Both the sulphate of copper and the alum require another crystallizing to purify them. The pure sulphate of copper sells at Khetree for Rs. 14 per Khetree maund, the impure for Re. 1. The alum sells for Rs. 4 per maund. Each maund of ore is said to yield $\frac{1}{4}$ of a seer of pure sulphate of copper, $1\frac{1}{4}$ seers of impure ditto and $\frac{1}{4}$ of a seer of alum.

The results of the expenditure and profit of one establishment were as follows.

Seven to eight maunds of shale, to which an equal quantity of the crust from the heap had been added, produced four large gurrahs of good liquor, each weighing 40 to 45 seers. Each gurrah gave 2 seers of sulphates in about equal proportions, and 5 seers of impure residue.

Four seers sulphate copper at 14 Rs. per maund, Rs.	1	6	5
Four seers alum at 4 Rs. per ditto, ...	0	6	5
Twenty seers impure sulphates at 1 Re. per ditto, ...	0	8	0
Total, ...	2	4	10

Or per month Rs. 69-1, which would be for eight working months Rs. 552-8. From this however, must be deducted the Raj's due, which is $\frac{1}{6}$ of the gross produce, or Rs. 92-1-4, leaving Rs. 460-6-8 per annum to the Bunya.

The expenses were.

Five maunds wood (at 16 maunds per rupee) and oplah (cow-dung cakes) per diem, say Rs. 8-5-4 per mensem or for 8 months, ...	Rs.	66	10	8
Gurrahs 1 Re. per mensem for 12 months, ...		12	0	0
Baskets, oil, &c., at 8 annas per ditto, ...		6	0	0
Wages to laborers 2 at 4 Rs. and 4 at 2 Rs. per mensem; total per annum, ...		192	0	0
Total of costs, ...		276	10	8
Leaving profit, ...		183	12	0
Total returns, ...		460	6	8

The above shows a profit of 183 rupees a year or 15 rupees a montl but if we allow for festivals, &c., the profit may be stated at 12 rupe a month, and the poor condition of the Bunyas who conduct the worl would not induce one to place it at a higher sum.

During the rains, the boiling of course ceases, as the sulphates wi not crystallize. At that time the water draining from the lower terrac is poured again and again on the upper ones, to bring to the surface much as possible of the undissolved sulphates in the heap. On fi days the labourers are employed in storing wood, or in visiting tl mines to lay in a stock of shale for operations during the mo favourable season.

List of Plates.

I.—Town of Khetree with hill fort.

II.—Pounders of copper ore with 'ghuns.'

III.—Koomhar making a smelting furnace for copper ore.

IV.—Copper smelting furnace in work.

V.—Copper refining furnace with troughs for metal.

VI.—Alum and sulphate of copper works, showing refuse heaps.

VII.—The same, (another view.)

VIII.—Interior of boiling house for alum and sulphate of copper.

No. 8. Interior of Boiling house for Alum and Sulphate of Copper.

List of Specimens forwarded.

1*st.*—First class glance ores and copper pyrites.

2*nd.*—Ditto glance ores, sometimes pounded and sold as Soorma (antimony) for the eyes.

3*rd.*—Average copper ores, usually smelted.

4*th* —Specimen of strata in which the copper ores occur.

5*th.*—Average copper ores freed from rock, before pounding by the "ghun."

6*th.*—Ore mixed with cow-dung and roasted, as put into the smelting furnace.

7*th.*—Slag picked up from mounds, (evidently still containing copper).

8*th.*— Alum shale with sulphate of copper ; (average specimen).

9*th.*—Sulphate of copper after first boiling.

10*th.*—Sulphate of copper (purified).

11*th.*—Alum after first boiling.

12*th.*—Ditto, (purified).

13*th.*—Sulphate of iron found in combination with the other sulphates.

14*th.*—Impure residue of alum, sulphate of copper, and nitrate of potash.

15*th.*—Ores, of which the miners desire an analysis.

16*th.*—Fossil wood encrusted with copper ore as dug out of the copper mines.

17*th.*—Cobalt ore, called by natives "Sheta," as found in the mines mixed with copper pyrites.

18*th.*—Ditto, ditto pounded.

In the box in which the above have been sent. are specimens of other ores, having, however, no connection with Khetree or its copper mines, viz.

19*th.*—Zinc ores from zinc mines at Jawur near Oodepoor in Meywar; not now worked. The specimens were struck off the rock in an old working.

20*th.*—Specimens of crude yellow ochre from near the same place.

21*st.*—Choice and beautiful specimens of carbonates and sulphates of lead from the lead mines at Ajmere.

22*nd.*—Antimony from the same mines.

Note on the hail-storm of Thursday the 24th March.—By Henry F. Blanford, *A. R. S. M., F. G. S., Joint Secretary of the Asiatic Society.*

[Received 6th April, 1864.—Read 6th April, 1864.]

The formation of hail is well known to be one of the most obscure phenomena of meteorology, more especially in the case of hail-stones of unusual size, which, from the very circumstances of the case, must be formed within the space of the few seconds succeeding the consolidation of their nuclei, and during which they are falling, in obedience to the law of gravity. In tropical climates, where the temperature at a considerable height from the earth is much above the freezing point, and where nevertheless, some of the largest recorded hail-stones have fallen, the stones must attain their maximum dimensions in the first portion of their fall, and during some subsequent seconds, must be subject to the liquifying influence of the lower and denser strata of the atmosphere. It has appeared to me therefore that a few observations on the stones which fell in Calcutta in a hail-storm on Thursday the 24th ultimo, may be not without interest as a contribution to this branch of Meteorology. For the thermometric, barometric and anemometric observations I am indebted to Col. Thuillier, the Surveyor-General.

The storm commenced about $\frac{1}{4}$ to 6 in the afternoon, the wind being from the south-east, and for a few minutes previous to the fall blowing in strong intermittent gusts, though not stronger than commonly precede the afternoon showers of this season.* The clouds, a thick mass of nimbus, approached or formed from the north-west, but did not move at any great rate, and indeed they appeared to be stationary during the latter part of the storm. Lightning was frequent, and forked, radiating in zig-zags from a small mass of cloud to those around, and the thunder was frequent and almost continuous, but not loud. Heavy drops of rain began to fall at $\frac{1}{4}$ to 6, and were soon accompanied by a few hail-stones about the size of hazel nuts. They were not very numerous,

* At the Botanic Gardens, the stillness of which is more favourable to observation than the noise of Chowringhee, Dr. Anderson noticed that the storm was preceded by a prolonged rushing sound, similar to that which would be produced by a number of railway trains rushing by at no great distance. This increased gradually, apparently from the north or north by west, and appeared to pass overhead, before the hail fell. The direction of the hail near the ground was from the south-east.

Fig 1.

Fig: 2

Fig 3.

Sections of Hailstones Observed on 24th March 1864.

Sections of Hailstones Observed on 24th March 1864.

perhaps one or two per square yard per second, and although they increased in frequency and number during the fall, which lasted about half an hour, they were at no time very thick, and were throughout accompanied by rain, which increased in proportion to the hail. As the stones increased in frequency, so also they increased in size, and the largest fell just before the end of the storm.

The form and structure of the stones are noteworthy. They had all of them a more or less oblate or discoid form, some being rudely elliptical in section, while others, and especially the larger, were irregular discs. The exterior was extremely irregular, resembling the extremities of a mass of crystals, but I noticed no regular development of crystalline faces. [It must, however, be remembered that the stones were partially melted at the time of their touching the ground.] The interior (nucleal portion) as seen in a fracture or a partially melted stone, fig. 2*a*. Pl. I. was formed by alternating opaque concentric bands (of which in one case I distinguished 7) separated by rings of less opacity, and the outer portion consisted of transparent ice containing numerous air-bubbles.* The air bubble which escaped from the largest of these when the stone was melted under water was as nearly as large as a grain of mignonette seed. The arrangement of the air bubbles was irregularly radiate. Many of the more discoid stones exhibited deep depressions, almost amounting to holes, in their axis, as shown in fig. 3.

The largest of the stones which I noticed, are those represented in figs. 1, 2. Pl. I. The dimensions of the latter of these, taken when first picked up, were,—diameter 45 mm. thickness 27 mm. The stone, fig. 4, is represented of its natural size, and its irregularity appears to be due to the coalescence of two nuclei. It is the only one I noticed exhibiting this phenomenon.†

* Dr. Brandis has since furnished me with the accompanying sketches of sections of the stones made by him during the fall. Pl. II. He points out that some had transparent, others opaque nuclei. I may also refer to these sketches as independent evidence of the oblateness of form, which, as I have above observed, characterized most of the stones.

† This must have been due to an oversight on my part, and my having been engaged in sketching the stones, &c. during the last 5 or 10 minutes of the fall. Dr. Partridge who lives only at the distance of a furlong, and Dr. Anderson three miles off, inform me that during the latter part of the fall, the majority of the stones were agglomerated. From their description, these appear not to have been larger than those simple concretions which I have figured. The weight of the largest weighed by Dr. Anderson was 3 drachms. At the reading of the

The thunder and lightning continued vividly for half an hour or more after the cessation of the fall, but gradually the clouds dissolved, and by 9 o'clock the sky was clear. The wind continued from the south-east for the remainder of the evening.

The fall was very local. At Serampore there was rain but no hail, *(Friend of India)*; at Dum Dum there was no fall simultaneous with that of Calcutta, but a heavy fall occurred about half or three quarters of an hour later, which Mr. Boulnois who left Calcutta after the end of the hail-storm, experienced on the road to Dum Dum (but which did not reach Calcutta). At Koolnah, according to the newspapers, there was also a heavy fall, and a stone is said to have fallen there of 5 seers (10 lbs.) in weight. This, however, wants confirmation. The total fall at Calcutta, as estimated by the lower Rain guage at the Surveyor General's Observatory, was 1.22 inches.

It would be a point of some interest to ascertain the direction of the wind, temperature and other meteorological data in the northern parts of Bengal *e. g.* at Moorshedabad, Purneah, Malda, Kissengunj, &c., in order to determine the causes of this interesting hail-fall. Hail, as is remarked by Sir J. Herschel, seems always to depend on the sudden introduction of an extremely cold current of air into the bosom of a quiescent,* nearly saturated mass. Now the dew point at 5 o'clock as calculated by Apjohn's formula from the observed temperatures of the wet and dry bulbs was 84,° the dry bulb thermometer being 86.6. The air was therefore very near saturation, as might be expected of a heated wind, which had recently swept over many hundred miles of a tropical sea. Were such a wind met by a cold current from the Himalaya, we should have the conditions required to produce hail, but in this case we should expect to find some indications of the northerly current in the direction of the wind, and in a lower temperature at some of the northern stations. It is not necessary that the temperature of this current should be below the freezing point. Its collision with the

above paper it was observed by the Honorable Mr. Beadon, and confirmed by other observers, that many of the later stones were very irregular and perfectly transparent lumps of ice. One in particular was described as resembling a double fanged tooth in form. These appeared to be agglomerated stones.

* The air could scarcely be said to be quiescent in this case as previous to the storm and again after its close the south-east wind blew strongly, but this would be checked when met by a strong northerly current, and an ascending current produced.

southerly current would cause a sudden rise of both into the higher regions of the atmosphere, and if this were very rapid the reduction in the temperature consequent upon the expansion of the heated air, aided by the cooling influence of the northerly current, might, I think, reduce the temperature sufficiently to cause the formation of hail. That such an upward current existed, is, I think, proved by the barometrical reading, which at 6 o'clock (2 hours after the afternoon minimum) gave a reading of 29.712 inches, whereas the corresponding morning reading was 29.811. At the usual period of the afternoon minimum (4 o'clock) the pressure was 29.719, at the morning minimum 29.769.

The clouds were not low during any part of the storm, but it is scarcely probable that the hail was produced in their lower strata. The quantity of rain which accompanied the hail was greater than could well result from the mere partial liquifaction of the hail-stones, and I am inclined therefore to infer, that rain fell from the lower strata of cloud, the formation of hail being confined to the upper portions of the mass.

The uniformly concentric structure of such stones as that delineated in fig. 2*a*, and the air-bubbles of the clear portion, afford interesting indications of the mode of formation of the hail-stones. The clear ice must have been condensed in the fluid form, and have contained a large amount of air in solution, which, as in the formation of lake ice, was squeezed out at the instant of solidification, forming the air-bubbles now entangled. The concentric zones indicate so many atmospheric strata of condensation and it is probable that they consist of radiating snow spicules *i. e.* ice condensed from vapour below the freezing point, and crystallizing on a solid nucleus, instead of forming free flakes. On this view each clear zone represents a portion of the stone formed in an atmosphere above the freezing point, and subsequently frozen, while each opaque zone represents that contributed by an atmosphere below 32°. This would shew a great variability in the upper strata of cloud, but such might result from the eddying of the mingling currents.

The oblate or discoid form of the stones and their axial hollows are more difficult to explain. Were they in rapid rotation, they might indeed acquire the observed form by centrifugal force, but there is no apparent reason why such a motion should be set up. I do not know that a similar observation has been previously recorded, but the prevalence of the phenomenon in the case of the hail-stones in the storm

recorded, prove that it is not accidental, but due to some cause operating generally in their formation.

I bring these remarks forward, in the hope that further observations may be elicited from some of our members or others, on the phenomena of the storm, as well as to draw attention to the importance and interest of this branch of meteorology, in case future storms may afford opportunities of detailed observation.

Observations on keeping Salt-water Fish alive for a considerable time.— *By* Lt.-Col. R. C. Tytler.

[*Received 28th Feb.*, 1864.] [*Read 6th April*, 1864.]

In offering the following observations for publication, I should here remark that they are entirely the result of a great many experiments, made during several months of my stay at Port Blair, and which I am happy to say have been completely successful.

1. If fresh water from the sea be put into a vessel and changed every twelve hours, sea fish will live in it.

2. It requires a quart beer bottle full of sea water, to keep a fish the size of a minnow alive for twelve hours.

3. After twelve hours, the water begins to be offensive, (from the escape of Sulphurretted Hydrogen;) the fish comes to the surface, swims in circles impatiently, and dies before twenty-four hours: the water about this time becomes most offensive.

4. If salt water be put into an iron vessel and boiled over a brisk fire till nothing but the dry salts remain, it will be found that a tea spoonful and a half of this salt, added to a quart beer bottle of fresh tank water, will keep alive a fish the size of a small minnow, for a considerable length of time, without any change of water being required for months: this simple fact took me months and months to arrive at, and it now affords me the greatest pleasure to make the result of my successful experiments known.

5. No food should be given to the fish, beyond a fly or smashed cockroach now and then.

6. Freshly caught fish should be kept in a vessel at least twenty-four hours by themselves, before being placed with those already in the aquarium.

7. To prove how successful the above plan has been, I should here add that I have brought fish alive from Port Blair to Calcutta that had at least been three months in the same water, and the latter was as fresh as possible up to that time.

Observations on a few Species of Geckos alive in the possession of the author.—By LT.-COL. R. C. TYTLER.

[*Recieved 27th March,* 1864.]

Port Blair, 1*st January,* 1864.

On several occasions lately, interesting living specimens of Geckoid Lizards have been brought from the jungles, which has induced me to make an attempt to keep them alive, for the purpose of observing their habits more closely, than appears generally to have been done; in order to accomplish this object I have been obliged to resort to many expedients, and the only one that has proved successful has been the following: I have had a great many boxes made of light deal wood, two sides of which are glass: the wooden portion is perforated with holes in every direction, so as to admit of air passing freely through : one of the glass sides forms a slide to allow of the box being opened when an animal is put into it ; at one end of the box is a small tin trough for water, similar to that used in Canary cages and at the bottom there is an inch of clean sand : a small branch put into the box for the use of Arboreal species, completes the arrangement, the tin for water is always kept full, and a number of living flies, or young cockroaches are kept loose in the box, and I find that this is sufficient for all the requirements of these Lizards.

My boxes vary in size, but the most convenient are 10 inches by 6, and two inches wide, or 6 inches by 4, also two inches in width ; but as the glasses are liable to accidental breakage, I have in a measure contrived to provide for and meet this, by having a separate light wooden box made, capable of holding six of the glass cases : this not only protects the glass, but keeps the freshly caught animal quiet, from being in the dark, and undisturbed, which it greatly prefers ; and prevents the restlessness it shews on such occasions in the light.

Without in any way wishing to question the existing classification of saurian animals adopted by naturalists, I feel in the present

instance, while studying the forms, and closely examining the habits of the geckos now alive in my collection, that it is incumbent on me simply to adopt the genus *Gecko*, for every species in the family, rather than place them in the several genera, enumerated in modern classification. Geckoid lizards bear a strong similarity to each other, and are in themselves unmistakable. One specimen alone is almost sufficient to mark the entire type, notwithstanding that on comparing species, one with another, a marked difference is visible, quite sufficient to distinguish species, but insufficient in my opinion for a division of the genus *Gecko* into genera, to meet alterations caused by size, or slight differences of form. I have therefore adopted the genus *Gecko* for all these lizards in my collection, whose habits I have lately been enabled to observe closely. The word *Gecko*, is evidently taken from the sound, uttered by very many of the species, in which 'yecko,' or 'gecko,' or 'chucko,' is distinctly audible. From the formation of the pupils of their eyes, it will at once be remarked, that they are more or less nocturnal in their habits. In many the pupil strongly resembles that of a cat, when much contracted. In the day, it is contracted to a fine dark hair line, but this is only the case with those which are most nocturnal; others again which are diurnal in their habits, preserve the fullness and rotundity of the pupil in ordinary strong lights: this is the case with my *Gecko chameleon* (*Phelsuma Andamanense* of Blyth,) a very beautiful species, peculiar to the Andamans, where it is found in great abundance. The pupil of this species remains round in all lights, and is intensely black; whereas, in my *Gecko pardus*, which, I think, may prove to be *Hemidactylus coctœi* auctorum, the irides, which are of a peculiar bronze and very metallic hue, shew during the day simply a very fine vertical hair-like pupil. Almost all the other small species have the same, but in *Gecko toucktay* of mine, which is *Platydactylus verus*, the irides, which are of a yellowish green, instead of having by day-light a hair-like contracted pupil, have five or six minute unconnected dots vertically arranged, which, on the reduction of light, rapidly increase and connect themselves, forming in the dark a full pupil. This latter I ascertained from a gecko that had died in the dark, the pupil of which I found to be fully developed and round. Geckos seem to feed entirely on insects; the localities which they frequent therefore, are those best suited to the description of insects they feed on, for capturing which, nature

has given them remarkable peculiarities, admirably adapting them for capturing their prey. I allude to the extraordinary power they possess of changing their colours, so as to adapt themselves to the various localities which they frequent, and by which their complete concealment is effected. In *Gecko Chameleon* for instance, when in dark places, or in the earlier part of the day, the colour is almost black with red markings, and this remains under ordinary circumstances till nearly mid-day, when a gradual change takes place, and the dark hue gives way to an intense emerald green on the body, with a bright blue on the tail, the under surface becoming of a fine canary yellow, and the red marks still remaining on the back. By one or two o'clock, the change of colour is complete, and the animal sallies forth from his dark place of concealment, on to the bright green leaves of trees, in quest of insects: but the change of colour may take place at any time during the day, according to circumstances of position and light; for if one of the green coloured lizards be placed in a dark spot, the colour changes to a dark hue, in the same ratio that the dark animal becomes green when placed in the sun, or in a strong light on the leaves of trees. The change of colour is also influenced by the seasons, for during the rains the change is not so rapid as it is in brighter weather.

The casting of the skin is of frequent occurrence with all the Geckos, but particularly so with *Gecko Chameleon*, and, strange to say, other lizards in the same case, devour the skin as soon as it is cast: in many instances I have even seen them tear it off before it was fairly changed. All Geckos are great water-drinkers; they drink by lapping with their tongues like dogs; it is therefore very necessary to keep the little tin trough in their cage constantly supplied with water. Insects should also be kept in their boxes to satisfy their voracious appetites. Though insect-eaters, and at times greedy and voracious, still they are capable of enduring hunger for a considerable length of time, without seeming to suffer any inconvenience from it. One of the most marvellous traits in the habit of the Gecko, is its power of frequently and most rapidly changing its colour, and also its markings, to suit the places it may be in; I have seen an animal become, from a light straw-colour, speckled all over with dark marks; and perhaps in another instant of time almost black or a light slate. No chameleon can change more rapidly or perfectly than the gecko. In *Gecko chameleon*, the change is more apparent and striking, owing simply to the contrast between an almost

black color and a brilliant light emerald green, but this change is not more remarkable than that which takes place in the more humbly coloured species; for in many, not only the general colour changes, but brilliant markings suddenly appear, which were previously invisible. An animal which is of a dull grey and transparent, and without any apparent markings, when examined in one of my boxes and held up to a strong light, may, when placed in a more subdued light, assume a brilliant tortoise shell hue, or a light straw, or perhaps become nearly black: such extremes and differences in colour are truly surprising.

Most Geckos have five distinct toes. The thumb is more or less defined, and the toes are furnished with or are without sucking pads, possessing more or less adhesive powers; those which have the pads less developed, or confined to the tips of their toes, find greater difficulty in ascending plane vertical surfaces than those which have the suckers fully developed. In some of the small species which frequent walls, a membrane unites the toes, while others possess membranes on the sides of their tails, heads and bodies; according to which characters the group is separated into several genera. A peculiarity in the claw of the gecko is its powerful retractility, which in some species is not confined to the claw, but is in a great measure possessed by the entire toe: the sucking pad is even capable of reduction, either by a folding process or an internal retraction. Another strange peculiarity is in the eye, which is furnished with a transparent case, behind which, the eye moves freely and rapidly.

In casting their skins, the portion over the face draws off from the nose towards the *occiput*, leaving the case of the eye, in some, unchanged. This, it will be perceived, is different from the process which obtains in the case of a snake when casting its skin, for in the latter case, the case over the eye is invariably renewed with the skin. I have already alluded to Geckos being entirely insect-eaters, and they are active insect-destroyers; but for all that, they are remarkably choice in the selection of their prey, as they may be seen for a considerable length of time, perfectly motionless on a wall, watching some particular insect they may have selected for their food; and they will, in the meantime, allow numbers of others to pass their very mouths, without making the slightest effort to secure them. Flies and cockroaches form a very favourite food, but the insect must be alive, or they will not touch it.

In collecting lizards, I always send natives out with wide mouthed bottles to put them into when caught, but this, simple as it appears, requires a little management and caution, for should a cork be put into the bottle, the animal is apt to die from suffocation, and putting too many in a bottle, causes perhaps the destruction of the whole; besides which, it often occurs, that a lizard may adhere to the side of the bottle, and shew great disinclination to quit it; the violent shaking then resorted to, to oblige it to do so, frequently causes the animal to die in a few days from its injuries it suffers. I find it is also a bad plan, to allow an injured gecko to be with others, for the skin being once rubbed off, the surface remains raw and tender for some considerable time; and the result too frequently is, that small ants are attracted, who will completely destroy a box of geckos in a night, by adhering to every one they can get hold of, and stinging it to death. This has happened to me on several occasions, and caution is required to guard against it, for the gecko, though an insect-destroyer, is a very timid animal, and rapidly flees from the attacks of insects.

During the day, geckoid lizards are found under stones or in boxes, and other suitable localities, but at night, a lamp near a wall will always attract them, whilst the insects fluttering about will always induce them to remain about the spot. Many of my most interesting specimens have been obtained in this manner. On such occasions, it it is not unusual to observe, the interesting, though at the same time, somewhat cruel habit of the larger sized geckos, destroying the smaller ones; and it almost invariably occurs, that if a large gecko is gently driven towards a small one, whilst on a wall, he almost immediately seizes the other, and a scuffle ensues, which ends either in the total destruction of the smaller one, or at all events the loss of his tail. Nature appears to have provided against this act of cannibalism amongst them, for the tail is easily detached, and although it becomes the trophy of the larger animal, its loss frequently enables the smaller one to escape with his life. The tail when detached, from a most sluggish appendage, becomes a very lively member, and owing to a powerful muscular action, wriggles about for a very considerable time. In about three weeks the tail is renewed on the tail-less animal. From the readiness with which the tail is detached, it almost appears that its rejection is voluntary, and resorted to to aid its possessor in escaping from imminent danger; but this can hardly be the case, for

it often happens that the renewed tail is deformed, either by being thicker at the junction, or, in many instances, by several tails branching off from that one spot.

The toe-pads or suckers are a perpetual source of care and attention to these little animals, who constantly keep licking them with their fleshy tongues, and removing all impediments to their adhesiveness; this takes place from the moment they are caught; the mere act of catching them appears to derange, in some measure, the regularity of their suckers; for when first captured, the animal remains perfectly quiet, as if astonished or paralysed, but on recovering from the effects of his surprise, he licks his pads, examining them minutely, and struggles violently to escape, and even endeavours to bite his captor; which latter, should he succeed in doing, is of but little consequence, as his bite is not in any way venomous.

The *Gecko toucktay* is considered by the Burmese, to be poisonous, though unfoundedly; and therefore this harmless lizard is looked upon with dread and alarm, though, strange to say, his startling and somewhat unearthly call, uttered on a dark still night, from some densely wooded spot, or interior of a house, creates little or no annoyance. The call of the *toucktay* is a frequent repetition of the word 'touck tay,' uttered in a hoarse sonorous and loud tone, repeated five or six times, and ending in a suppressed groan, as if his efforts were entirely exhausted.

Though some few geckos are more or less furnished with an interdigital membrane, bearing the appearance of a swimming web, I have never seen them voluntarily take to the water, but they confine themselves to trees, rocks and houses. It is possible, however, that during heavy rains, when water accumulates in different places, these animals may have to swim in order to save their lives, in which case these membranes must materially assist them in so doing.

Geckos preserved and sent to museums in spirits for scientific purposes, undoubtedly answer all that is required for the examination of their structure, but as most of them have the power of changing their colour, and as in many instances preserved specimens lose some of their peculiarities, I find that to study and form an idea of the habits of these little creatures, it is necessary to examine and watch them in their living state, when they will be found to afford a highly interesting study, very astonish-

ing and of a very pleasing nature. The larger *saurians*, from their imposing size, have rendered themselves familiar to many, but the little gecko has seemingly been neglected, though constantly put into bottles indiscriminately, and sent to museums with little or nothing said about its habits, beyond a casual remark of its being found on walls or trees, and apparently an insect-eater. In reality little or nothing is known of the habits of Geckos, and these can only be ascertained by taking an interest in these minute creatures, and keeping them in a glass box for constant examination.

The *Gecko toucktay* is a very savage animal when first caught; and as he dashes with the greatest ferocity to bite his captor, his huge gaping mouth and ferocious aspect render him a somewhat alarming as well as forbidding animal to look at, notwithstanding the pretty red, white and slate-coloured markings he has over his body.

I find that *Geckos* which have spines on their tails, on losing the tail and the same being renewed, have the newly formed tail smooth for a considerable length of time, nor do the spikes appear for at least three weeks or a month after its formation. When at rest, the gecko coils his tail, so as to be entirely concealed in the crevice or other place he happens to be in; but when in search of food, or disturbed, the tail remains at its full stretch, and in a certain measure assists him in adhering to walls or other places, as well as to guide him in his movements. When a gecko loses his tail, he appears to be much inconvenienced by the loss, for instead of creeping gracefully and leisurely as he generally does, his movements become short leaps, or a succession of rapid running jerks with his head elevated.

On seizing an insect, the gecko does not use his tongue, but seizes his prey with his jaws, and after a few bites and gulps swallows it without tearing it to pieces. The tongue of the gecko is large and fleshy, and rounded or notched at its extremity, which is free. The teeth, which are very small, are sharp with cutting edges, and numerous, adhering to the internal margin of the jaws, but there are no palatine teeth. A curious and somewhat strange peculiarity in these lizards, is that on being caught they pass a quantity of urine, which is evidently not the result of alarm, but it seems as if this is resorted to for the purpose of aiding them in their escape when seized by other animals. The liquid is quite clear, and although plentifully passed on the seizure of the animal, it is often ejected when not

disturbed. That this liquid is capable of producing sores on a tender skin, I doubt not; for when my fingers have been touched by it, on several occasions, I have felt an unusual caustic sensation and even a tingling at the tips, which after the lapse of a few minutes entirely passes away.

In a *gecko touektay* brought to me at Moulmein, and which had been put alive into a dry bottle, I was astonished to see the amount of moisture collected in the bottle in a few hours, as well as the water which seemed to be coming through the pores of the skin; for though the greatest portion had been passed during the night, moisture was still passing through the pores of the skin in the morning.

I find whenever my specimens of the *gecko tidæ* are in bad health or about to die, a gradual wearing away is visible; the neck becomes very thin and dilated, the head looks unusually large, the lips swell and become sore, the eyes much projected; particles of dust also adhere to the transparent, immovable eyelid, and about the corners of the mouth, which latter often fills with dust; when this occurs they seldom or ever recover. The presence of dust on the immovable eyelid, is in itself a marked indication of approaching death, for geckos constantly lick it with their tongues, and keep it scrupulously clean when in health. The living animals in the same box do not in any way seem to shew repugnance at the presence of a dead companion, but move about it, or cluster around it precisely as if it were alive. The clustering of these animals, when not confined in a box, is not unusual, for I have found several concealing themselves in the same crevice, where they sometimes lay one over another. In my glass cases this is a frequent occurrence.

I have already remarked on the constant casting off of the skin, on the part of the *Gecko chameleon*, and although it is less frequent with others, still they all cast their skins often, and in the glass boxes this would appear to occur more frequently than elsewhere: the confinement may perhaps in some measure influence the act, and promote a more rapid change; before it takes place, the animal becomes unusually languid and of a grey slate colour, appearing in certain lights of a whitish hue. As the time of casting approaches, the grey colour becomes darker and duller, all markings disappear, and the skin begins to crack and fall off, either in one or several long pieces; that of the tail being the last, which slips off like a long sheath. Other *Geckos* in the same box, attracted

by the pure white appearance of this cast off coat, seize and eat it. The skin is of a pure white, beautifully netted and marked, strongly resembling that of snakes. No sooner is the skin cast off, than the little creature becomes quite lively again. A *toucktay* which I had, commenced casting its skin in one of my boxes, two or three days after its capture; on the third day the skin cracked and as usual began to peel off. On this occasion, it was nearly a week getting rid of its skin, but for all that, I do not think it was in any way weakened by the operation, as might reasonably be expected from the animal's sluggishness and refusal of all food. I have observed that geckos on touching shining or polished surfaces, invariably lick them with their tongues, probably mistaking them for water, but the *gecko chameleon* does the same to the small shining particles of sand.

The contraction of the eye of these lizards is remarkably cat-like, but in *gecko toucktay*, it is more remarkable than in any other, from the peculiar greenish hue of the iris, which is so markedly different from the brass bronze lustre, or brown hues of the smaller species. When the mouth of the *toucktay* is open, it is truly hideous, the inside appearing like a deep pink cavern, with the palate black. Although this is equally descriptive of the smaller lizards, it is most striking in the larger ones. Although the *gecko toucktay* is vicious and furious, it soon becomes reconciled to confinement, and does not attack or bite others of the same species, when put into the same box. This huge gecko adheres to a wall, or the perpendicular surface of a pane of glass, as firmly and as securely as the smaller animals, and is almost more tenacious of its hold, requiring a strong shove or even stroke to knock it off a wall: during the day this animal adheres to a wall or tree with his head downwards, or frequently hangs by his hind feet, with the head down and the front feet clasped together.

Other *saurians* may in a great measure be able to cling to, and ascend vertical surfaces, but the power of adhering to such places like a fly, with suckers, and to traverse ceilings with the greatest facility and rapidity, where no other lizard dare venture, belongs exclusively to the gecko. This is effected by means of their flattened and expanded toes, which are transversely laminated beneath, or furnished with powerful imbricated suckers; and by its claws, which are sharp-hooked and retractile like a cat's, and greatly assist the suckers in

their hold: for they have a clinging capability, which, when added to the suction of their toe-pads, gives the animal a surprisingly powerful hold, the toe-suckers acting in reality like minute air-pumps. I have lately lost a beautiful specimen of the *gecko toucktay*, which, previously lively and active, died suddenly. On a *post mortem* examination, I found in the stomach, an oblong piece of a substance like lime, the size of a marble, and as hard as a stone, and which had evidently caused its death. It is possible that since so many species of the smaller geckos inhabit the same place, hybrids may be of frequent occurrence; and this I have had reason to suspect in many instances: but although several species of geckos may inhabit the same locality, yet, as a general rule, they keep separate and aloof from each other; for instance in a house, the dark cellars may be the resort of one species, the roof of another, and crevices in the walls may be occupied exclusively by a third species. However, at night they issue forth in quest of insects, and may be found mixed up together in the same spot, but on the slightest disturbance, or when they have done feeding, they return hurriedly to their particular hiding-places.

Two eggs of a perfectly round and milk-white colour seem to be the most they lay. These lie about chinks in the wall, unprotected till hatched, which process takes place according to temperature and other circumstances. When the eggs are first laid they are soft, and covered with an adhesive glutinous substance, which causes the eggs to stick to any surface, as well as frequently to each other. Shortly after the eggs are laid, the shell and gluten become perfectly hard, and were it not for this admirable provision of nature, these light minute eggs, would be blown about by every breath of wind, and their hatching would be rendered almost an impossibility, particularly so in the localities their parents intend the young to inhabit. The power the geckos possess of introducing themselves into minute crevices, is owing to the natural flexibility of their bodies, the formation of which is depressed, and covered with imbricate scales or tubercles, and frequently spines like prickles, on the tail as well as on the body. Femoral pores exist in the males or in both sexes, but there are several species in which no indication of these pores can be found. Besides the immoveable case which covers the eye, and behind which the eye moves freely, there is a slightly developed regular eyelid, which, from its incomplete formation, gives a staring glance to the animal, for the eye is itself naturally

very large, full and bright. The orifices of the ears are on the side of the head, with the membrane of the tympanum much depressed.

I have already said that in my classification of the living geckos in my collection, I should simply adopt the genus *Gecko* in preference to the acknowledged genera, but as this may not be satisfactory to others, I will here briefly classify the geckoid saurians. Their position in the zoological series is in the second section *(haplapnoa)* of the class *reptilia*; in the order *saurii*, tribe *squamati*, and family *ascalobotæ*. This family, in my opinion, admits of only one genus, *Gecko*, but owing to the structure of the feet, the toe-suckers of which vary considerably in form, and are quite a study in themselves, the geckos have been divided into several genera, the principal of which I shall here enumerate.

Lomato-dactylus (Van der Hoven),	*Leiurus* (Blyth),
Platydactylus (Cuv.),	*Sphæriodactylus* (Cuv.),
Pteropleura (Gray),	*Diplodactylus* (Gray),
Hemidactylus (Cuv.),	*Ptychozoon* (Kuhl.),
Ptyodactylus (Cuv.),	*Crossurus* (Wag.),
Phyllodactylus (Gray),	*Stenodactylus* (Fitz.),
Thecadactylus (Dum.),	*Gymnodactylus* (Spix.),
Phelsuma (Coct.),	*Tarentola*,
Rhacodactylus (Fitz.),	*Phyllurus*,

and a great many more, but I think the above may be considered the most important of those hitherto acknowledged: but without specimens of the animals or good illustrations, which latter these brief observations of mine do not admit of, it is totally impossible for me to describe, or convey any idea of the peculiarities existing in the formation of the suckers of the several species.

I will now describe each of my living specimens separately. It is possible that some of them may have been described already, but as I am not aware of any such description and have no means of reference, I will name each myself and give a brief description of it.

1. *Gecko verus*; length 9 to 12 inches; general colour, dark slate with light ash coloured bands round the body; the light bands are spotted with white, and the dark slate with red spots. The tail is of the length of its body with bands all round it of light and dark slate, divided by dark red or nearly black bands. Irides greenish yellow, large and full of veins. Body compressed, with rough tubercles on the surface, as also on the tail, of a small size. The males are darker than the females, and

also larger. Toes five, of nearly equal size, furnished with powerful suckers. Head large: pupil of the eye with powerful contracting powers: the eye is large and staring. Inside of the mouth red. Very vicious and bites with great ferocity: inhabits Burmah: my specimens are all from Moulmein. Found in houses, trees, &c., and called by the Burmese *Toucktay*, [*Platydactylus verus* of authors]. The Burmese name is in imitation of its call, which is five or six times repeated.

2. *Gecko Verreauxi*, n. s., Tytler; a splendid large new species found on the main island of the Andamans, as also on the smaller. In size it not only equals the last named species, but is frequently larger, measuring from 13 to 14 inches in length. I have named it after my esteemed friend *M. Jules Verreaux* of Paris, the great and well known naturalist. The *Gecko Verreauxi* is of a dark brown colour above and lighter beneath: those sent to me from Mount Harriet have little or no marking, but those from Aberdeen have dark markings on the back, and sometimes circles on the tail. The body is covered with tubercles, and there are six rows of prickles or spines on the tail; which latter is flat sided. A deep grove runs down the centre of the tail, which is as long as the body. There are two rows of these spines on the top and two on either side of the tail. The animal, in colour, is so like the bark of an old tree or dried wood, and so changes its brown hue to suit the colour of the tree it may be on, that it is a matter of the greatest difficulty to find it. The animal has a very formidable and forbidding look, and the natives greatly dread it, so that it is difficult to obtain. The colour of the irides is a metallic yellowish green, full of veins; the eyes are large and full. Each foot has five large toes with powerful claws and large suckers. The call of this species is a loud '*Tuk Tuk Tuk*' five or six times repeated.

3. *Gecko tigris* (Tytler). I think this is the *Puellula rubida* of Blyth, for the character which induced him to give this generic name to a gecko he received from the Andamans, is perceptible in all my living specimens: I have called it *tigris* from its fierce disposition. In length it is from 5 to 6 inches: general colour brown with numerous dark markings, and rings round the tail: the markings are in the shape of lines. The tail is longer than the body, and when the animal is moving, the tail is held up horizontally and stiff, with a curl at the tip: the back is rough with tubercles, as also is the tail. The under surface is fleshy and smooth and of a purple hue. The upper eyelid with a yellow line on it:

irides of a brownish green. Toes with very minute suckers, scarcely visible, appearing as if none existed : toes five on each foot, long and nearly equal. The colour of the animal is very changeable ; a dark variety with deeper markings has been brought to me from Mount Harriet. The species appears to be peculiar to the Andamans, where it is found under stones, stumps of trees, &c.

4. *Gecko Tytleri* n. s. (Tytler) ; from 4 to 6 inches long ; body and tail rough, covered with small tubercles ; the tail has also spines on it. Toes five ; the thumb small ; suckers on the toes small. General colour brown, lighter on the under surface ; colour very changeable. Irides brown. Found all my specimens in dark cellars at Moulmein, where the species is common.

5. *Gecko chaus*, (Tytler). I think this is *Hemidactylus frœnatus* of Schl. Length from 4 to 5 inches ; tail as long as, or longer than body. General colour slate grey, lighter on the under surface ; colour very changeable ; body smooth with dark marks ; tail with spines. Feet with five toes ; thumb small ; suckers on toes of moderate size. Irides brown. Found on trees, in houses, &c., at Moulmein and Rangoon : those found at Rangoon are somewhat smaller than those from the former place, and a slightly darker variety.

6. *Gecko caracal*, n. s., (Tytler) ; very similar to the above, but without any spines on the tail ; found in dark cellars, but chiefly in native huts at Rangoon. Length about 4 inches. At first from its great similarity to No. 5, *Gecko chaus*, I was inclined to think it was simply a local variety of that animal, but I now feel satisfied it is not so, but a distinct species. It can at once be distinguished from *Gecko chaus* by the absence of prickles or spines on its tail, this latter being perfectly smooth in *Gecko caracal*.

7. *Gecko pardus*, (Tytler) ; length from 4 to 5 inches ; body much compressed ; tail flat, thick and fleshy at base, passing off to a fine point. Body dotted with light spots, margined with minute dark spots and specks ; general colour brown, very changeable ; lower portions lighter, without marks. Irides metallic yellow like brass. Toes five, full size, connected by a membrane ; suckers full size. A great variety of markings found in different individuals. Found in houses at Rangoon, Moulmein and Port Blair : those obtained at Port Blair have a thicker tail than those I collected in Burmah. I am of opinion that the Port Blair

animals have been introduced into the settlement in boxes, &c., from Burmah, for I have hitherto only obtained them on Ross island, and not from the main island. I do not think this can be a new species, for it is very common.

8. *Gecko Harrieti*, n. s. (Tytler). This beautiful little Gecko varies in length from 2 to 3 inches. Its general colour is light brown, with particularly pretty, dark markings: a dark mark extends from the nose along the sides, but the colour is so very changeable that it is impossible to describe it: from a light straw, it instantaneously becomes almost of a dark brown. It has five well developed toes, with full sized suckers under each. Irides bright copper colour. Tail equal in length to body. Under portions lighter than upper, without markings. The tail is curled when at rest. It is perfectly arboreal, frequenting trees, and is found concealed under the bark: inhabits the Andamans; all my specimens are from Port Blair and its neighbourhood. I have named it after Mrs. Tytler.

All the Geckos which I have described above, have pupils which contract like those of cats, and are more or less nocturnal in their habits; but the following species is quite diurnal, and the pupil does not seem to contract, but remains round and full all day.

9. *Gecko chameleon* (Tytler.); (*Phelsuma Andamanense* of Blyth); about 4 to 6 inches long: general colour, in the sun or strong light, rich emerald green, with blue or green tail; under portions bright yellow; red marks on head and back in most individuals; in dark places or in a subdued light, the colour is perfectly dark, nearly black; the markings slightly visible and the yellow usual on the under portions entirely disappears. These lizards are quite arboreal. Feet with five toes; thumb very small; suckers of moderate size: tongue bright red. Peculiar to the Andamans, where the species is very common.

*Inscription on the Muqbura at Hailan.**

(Communicated by the Punjab Auxiliary Committee of the Asiatic Society.)
[*Received 16th February*, 1864]

کتبه جانب شمال بر مزار

نَادِ عَلِیًّا مَظْهَرَ الْعَجَائِبِ تَجِدْهُ عَوْنًا لَکَ فِی النَّوَائِبِ مِنْ کُلِّ هَمٍّ وَ غَمٍّ سَیَنْجَلِی بِفَضْلِکَ یَا اَللّٰهُ بِنُبُوَّتِکَ یَا مُحَمَّدُ بِوِلَایَتِکَ یَا عَلِیُّ یَا عَلِیُّ یَا عَلِیُّ *

اَللّٰهُ لَا اِلٰهَ اِلَّا هُوَ الْحَیُّ الْقَیُّومُ لَا تَاْخُذُهُ سِنَةٌ وَّ لَا نَوْمٌ لَهُ مَا فِی السَّمٰوٰتِ وَ مَا فِی الْاَرْضِ مَنْ ذَا الَّذِی یَشْفَعُ عِنْدَهُ اِلَّا بِاِذْنِهِ یَعْلَمُ مَا بَیْنَ اَیْدِیْهِمْ وَ مَا خَلْفَهُمْ وَ لَا یُحِیْطُوْنَ بِشَیْءٍ مِّنْ عِلْمِهِ اِلَّا بِمَا شَآءَ وَسِعَ کُرْسِیُّهُ السَّمٰوٰتِ وَ الْاَرْضَ وَلَا یَؤُدُهُ حِفْظُهُمَا وَ هُوَ الْعَلِیُّ الْعَظِیْمُ

اَلَا اِلَی اللّٰهِ تَصِیْرُ الْاُمُوْرُ نَصْرٌ مِّنَ اللّٰهِ وَ فَتْحٌ قَرِیْبٌ وَ بَشِّرِ الْمُؤْمِنِیْنَ *

کتبه بالای مزار جانب سر

مُحَمَّدٌ رَسُوْلُ اللّٰهِ عَلَیْهِ السَّلَامُ *

او پر کیطرف لکها هوا تها

اَمِیْرُ الْمُؤْمِنِیْنَ اَبُوْ بَکْرِنِ الصِّدِّیْقِ اَمِیْرُ الْمُؤْمِنِیْنَ عُثْمَانَ اِبْنِ عَفَّانِ

نیچی کیی طرف

اَمِیْرُ الْمُؤْمِنِیْنَ عُمَرُ الْفَارُوْقِ اَمِیْرُ الْمُؤْمِنِیْنَ عَلِیُّ اِبْنُ اَبِی طَالِبْ اَللّٰهُمَّ اغْفِرْ لِصَاحِبِ الْقَبْرِ *

مزار مرزا مرحوم پر بمقام سر بالای مزار شریف
بخط عبرانی مثلث تین خانه بنا کر لکها هوا هی

* See *ante*. p. 404

کتبه پہلے خانه کا

وَمَا تَوْفِيقِي اِلَّا بِاللّٰهِ عَلَيْهِ تَوَكَّلْتُ وَ اِلَيْهِ رَاجِعُونَ •

نہین توفیق مجهکو مگر بامداد خدا کے اور اوپر خدا کے توکل کي مین نے اور طرف خدا کي هی باز گشت •

کتبه دوسرے خانه کا

هَذَا الْقَبْرُ لِمَرْحُوْمِي اَمَغْفُورِ اِلَى اللّٰهِ الْغَنِيِّ الرَّحِيْمِ

یهه قبر مرحومه بخشي هوئي کي طرف خدا غني اور رحیم کے

کتبهٔ تیسرے خانه

شَيْخَ عَلِي بِيْكَ اِبْنِ حَسَنْ عَلِي خَانَ عَرَبْ •

تحریر بتاریخ شهر رجب سنه ۹۹۹ ه

کتبه بالاي مزار شریف کا یهه هی

ترا بکوے اجل هم گذار خواهد بود
قرار گاه تو دارالقرار خواهد بود
ترا به تختهٔ تابوت در کشند روزي
اگر خزانه و لشکر هزار خواهد بود
ترا بکنج لحد چون بسی بباید خفت
تن تو طعمهٔ هر مور و مار خواهد بود
مگر که کردهٔ کردار خود نهان داري
یقین بدان که همه آشکار خواهد بود
بسی سوار که انجا پیاده خواهد شد
بسی پیاده که انجا سوار خواهد بود
بدین عمل که تو داري بهشت میطلبي
بهشت منزل پرهیز گار خواهد بود
بساز توشهٔ رفتن که همرهان رفتند
که سعدي از تو همین یاد گار خواهد بود

قطعه

شبی با فلك گفتم از روي حسرت
که اي کار تو سر بسر بی وفائي

بسی دا غهائی نهي با دل من
گه از دوستانم جدا می نمائي
جوابی بگو دارم از تو سوالی
که یا بد دل از قید عالم رهائي
چه بد ترز اندوه مرگ آدمي را
بگفتا جدائي جدائي جدائي

رباعي

اي فلک با من عجب نقشی غریبي ساختي
با مراد خویش بودم نا مرادے ساختی
با مراد خویش بودم خواستم عیش تمام
خانهٔ عیش مرا ماتم سرائی ساختي

قعطه

فغان زگردش ایام وچرخ نافر جام
من و ترا ز میان عجب جد انداخت
ترا بملک غریبي مرا بگوشهٔ غم
ترا کجا و من زار را کجا انداخت
امیدوار چنانم که سر نگون گردد
فلک که طرح جدائي میان ما انداخت

رباعي

شاها بیا که حسن و جوانی مدام نیست
دایم شراب عیش کسی را بجام نیست
ایک روز خور مي بجهان تا بشام نیست
محبوب در کنار کسی را مدام نیست

رباعي

فلک بکشتن من این قدر شتاب مکن
که خواهم از ستمت مرد اضطراب مکن
فلک بکام تو گر نیست اضطراب مکن
بیک قرار نماند جهان شتاب مکن

Peculiarities and Uses of the Pillar Towers of the British Islands, by Dr. T. A. Wise.

[*Received* 25*th March*, 1864.]

So much has been written on the Pillar Towers of the British Islands, and so conflicting are the conclusions drawn, that it may be of use to direct the attention of members of the Asiatic Society, to these remarkable monuments of antiquity, in the expectation of obtaining more correct suggestions than have hitherto been made, regarding their use; as there is a growing belief that they are of Asiatic origin. In the course of the following remarks several examples of Indian Pillar Towers will be mentioned; and it is hoped that photography will afford aid to prove their relationship with those in Europe. Their number must necessarily be few, owing to the lapse of centuries, and to their having been generally destroyed by the persecuting Brahmans; and they will therefore only be found in distant and unfrequented places.

There are no records of the people who built these Towers, or the purposes for which they were built in Ireland and Scotland; and they are so ancient that the most general traditions among the people are that they were the work either of fairies, or the "good people," or "the weird people of the Beghts"; or of saintly old women; or of the Danes, the last conquerors, and cruel devastators of Ireland in ancient times. Without stopping to criticise such fancies, I shall confine myself to a general description of the peculiarities and uses of these remarkable structures, with a few remarks on the probable age in which they were built.

General description.—The graceful outline, and simple style and construction of the Pillar Towers, standing in the solitary waste, or rising unchanged amidst mouldering ruins of churches and tomb-stones, and their mysterious origin and uses, have long occupied attention, and afforded scope for the ingenuity of antiquarian speculators.

There are 118 of those Pillar Towers in Ireland, and two in Scotland; and they appear to have been constructed by powerful and intelligent missionaries, animated by religious zeal and a sense of security. Such an origin would explain their resemblance to each other, in their graceful form

and peculiar structure. They are from fifty to sixty feet in circumference, and eight or nine in diameter throughout, and are divided into from three to seven or twelve stages, forming apartments of different heights. Their floors are supported in some instances by ridges taken off the thickness of the walls, or by abutments or rests four or six inches in size. In the older Towers, holes are left for the reception of beams to support the floors.

Some of the Pillar Towers have holes in the lintel-stones to receive the hinges of the door. In other Towers the door appears to have been kept shut by a ladder resting upon the opposite wall, and against the closed door; in others again by a bar across the back of the door, the extremities resting in holes behind it, to keep it shut; which fact, with the depth of the floor below the door, prove that security was attended to. The different stages or apartments of the Pillar Towers were reached by a ladder drawn up from the elevated door, and from floor to floor as required, in times of danger. The entrance was from eight to twelve feet from the ground, was generally wider below than above, and flat, or rounded at the top. There were two kinds of windows; those near the top were generally four* in number turned to the cardinal points of the compass, and below these were small oblong openings at intervals, generally in opposite directions, to give light to the different stages of the Tower. Their size, position, and number, vary considerably in different Pillar Towers. The Towers are usually covered with a conical top, sometimes laid with horizontal, and in other cases by herring-bone masonry.

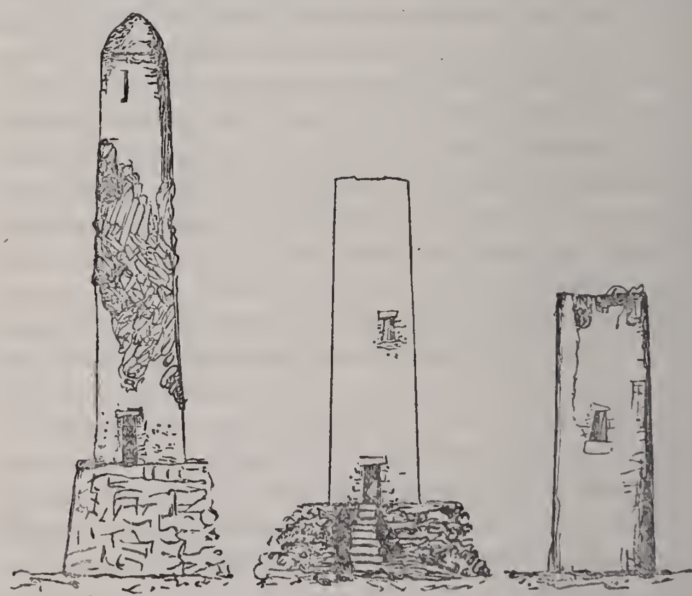
Neither the number of stories, nor the direction of the entrance or windows were of any material importance to the object of the building, as they varied so much in different Towers. The Towers generally resemble each other in the entrance being elevated seven, ten or thirteen feet above the surface of the ground; whereas the floor of the Towers is often three or four feet below the level of the door; and up to this elevation, the Tower is generally solid, sometimes with a projecting ridge of four inches, on the outside, level with the ground. The foundation descends two or three feet below the surface, except where the Tower is built on the solid rock.

* There are nine in the Pillar Tower of Clonmacnoise, and none in that of Dunnoughmore.

The stones of which the Pillar Towers are built were carefully and judiciously selected, and were often brought from a distance. They are fashioned into an oblong square form, accurately adjusted to each other, and embedded in a small quantity of shell lime,* the interior being common rubble work. The dressed stones are laid in horizontal layers, or in some cases in a somewhat spiral form, rising from the left to the right, in order apparently to add strength to the building.

The Pillar Towers were built by different races of mankind for various purposes; their construction extending over a period of several centuries, which fact will assist us in explaining many of their peculiarities. This has induced me to arrange them as Pagan or primitive, transition or Saxon, and Christian or Norman, which classification will be found more useful, than perhaps, strictly correct.

1. The Irish Pillar Towers of the primitive, early or simple form are few in number, and are more mutilated than the others owing to their age, to the stones having been selected with less care, and to



Clondalken near Dublin. Ross Camk near Galloway. Drumcliff near Sligo.†

* Ulster Journal, vol. I, p. 146.

† A road contractor tried the effects of gunpowder in reducing this venerable tower for road purposes.

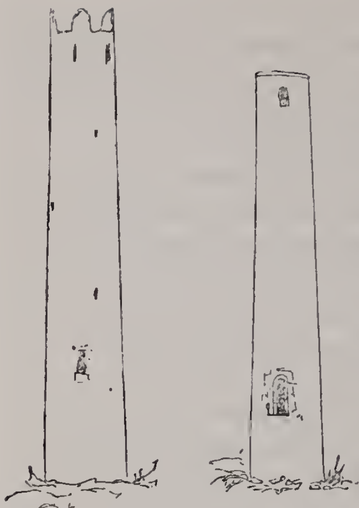
the dressing and arrangement not being so good as in the other classes. Like the early erect stones or obelisks of the North East of Scotland, they were numerous and were erected by Pagan workmen; but they underwent considerable changes as the people advanced in knowledge, social position and religious opinions.

These are examples of the primitive Pillar Towers, which appear to have been erected by Buddhists between the first and the fourth centuries, as is indicated by the sacred symbols of the sun or deity. They were unacquainted with the use of the arch. This is a strong indication of their Asiatic origin: for, amidst the most graceful and splendid remains of Buddhism in Asia, the absence of the arch is most striking. It was with the object of propagating their faith, that the Buddhist Missionaries visited Ireland; and at this early period they would find the country in a rude condition, and governed by numerous chieftains in constant collision with each other, while exposed to the inroads of seafaring robbers: not united enough to resist effectually, but too strong to submit to their tyranny. It was among these turbulent factions that the Buddhists first found it necessary to erect the Pillar Towers, both as a sacred emblem, and as the most simple and effectual means of obtaining personal security, as well as a safe deposit for the sacred relics and most precious effects of their religious worship.

The Chinese Travellers who visited India to study the Buddhist religion, and saw the use to which the Pillar Towers were put, enable us to explain the means employed to call the congregation to their devotions. This was done by the use of cymbals, horns, and drums; and this explains the use to which the brass trumpets were put, which are still sometimes found in the neighbourhood of the Pillar Towers in Ireland.

Besides the Pillar Towers figures of which are given, the following belong to this division: that of Luck in the county of Dublin; those of Tighado, Kildare; and Clones, Monaghan.

The Towers of the second class were constructed during the transition period, and were built by native artists as sacred monuments, and owing to their acquired power, with more care and skill than the primitive towers. This may explain the retention in general of the distinctive form of the earlier edifices, which were intended as safe places of retreat and defence.



Cloyne, Ireland. Abernethy, Scotland.

The Cloyne Pillar Tower may be instanced as an example of this class. The top of this graceful tower was injured by lightning, and a battlemented top was built upon it. The reddish coloured sandstone of which the tower is built, was obtained in the neighbourhood, and is still in excellent preservation. The curvature of the tower was worked with a chisel-pointed hammer. The stones are large and flat-bedded, and carefully worked into the form required. The thickness of the wall at the door is $3\frac{1}{2}$ feet, and the diameter is 9 feet 2 inches throughout. The door-way looks S E by E. and is $11\frac{1}{2}$ feet from the ground. It is flat topped, being covered with a lintel, and is wider below than above. The tower has six stories; the first being on a level with the door, and the others resting upon ledges projecting from the wall; the height of these chambers is $11\frac{1}{2}$ feet. The four top windows face the cardinal points, and like the door, are broader below than above, in the Pelasgic and Egyptian style. Below, there are several small openings, one of which, over the door, is larger than the others, and has a marked modification of the arch.

Only two round Pillar Towers exist in Scotland. These have the same peculiar form and structure as those of Ireland, appear to have been built at the same early period, and afford good examples of the two varieties already described, while they are surrounded by the same mystery as to their uses.

The following description of the Abernethy tower is extracted from a previous essay of mine.

'Abernethy,* in Fifeshire, was the capital of one of the Pictish Governments, but the Pillar Tower which is situated there is not mentioned in any of our ancient histories. We only know that the people

* The name is derived from *aber* confluence, of the small stream Nethy, that passes down to the town and into the river Earn; and the town is sometimes still called by the Scoto-Irish name *Invernethy*.

were christianised, and the town and adjacent district were dedicated to God and Saint Bridget, in the fifth century (A.D 456)*. It is probable, at this early period, that they followed the heathen custom of worshipping in the open air, (*sub dio*) at sacred stones; for we find in the eighth century (A.D. 711) that Nectan III., King of the Picts, being dissatisfied with the primitive custom of worship, and desirous to follow the Romish ritual, wrote to Ceolfred, Abbot of Jerrou, in Northumberland, requesting information regarding certain disputed observances, and asking for architects to build a church, which was to be dedicated to St. Peter, the Prince of the apostles.† The architects were accordingly sent, and the church was built of stone, like that of the Romish church. This has passed away; new churches, and a collegiate establishment formed by the Culdees, and a priory, established in 1273, have disappeared: since then, another very old church has been taken down, and in the beginning of this century, another was built rather remarkable for its superior style of architecture. During these changes, extending over a long period, the Pillar Tower has stood, and is still distinguished by its form, and by the admirable manner in which the material was selected and the building executed.

The Abernethy Tower stands on a sloping bank, at a short distance from the Ochill hills, and a mile south of the river Tay, near where it joins the Earn. The view from the tower is contracted towards the south by the proximity of the hills, where a beautiful valley stretches southwards; while to the north, there is an extensive prospect of a rich and undulating country, the granary of Scotland, towards which direction the entrance of the tower looks. The building is 75 feet in height, and 48 feet in circumference; and its extreme diameter at the top is 13 feet 9 inches, increasing to the bottom, where it is 15 feet 6 inches; the thickness of the wall at the top being 2 feet 9 inches, and at the bottom 3 feet 7½ inches. The tower is now without a roof, and the coping over the wall is probably modern. It is divided into five stages, each supported by stone abutments. The tower is built of sand-stone, which is now much disintegrated, except on the lower and western side, where there are twelve courses of grey freestone, little changed by exposure to the weather. The stones are all carefully dressed, convex on the exterior, tapering inwards, and concave on their inner

* Innes' *Critical Essays*, vol. 1, pp. 111, 122, 117.
† Bede, L. 5, c. 21.

surface, to give a circular form to the tower; and they are accurately adjusted in regular courses with but little lime or cement. The doorway is six feet above the base of the tower; but in consequence of the graveyard adjoining having become greatly elevated above the general surface of the soil, the door is now only two feet above the ground. It is 7 feet $9\frac{1}{2}$ inches high, 29 inches in width at the spring of the semicircular arch, and $27\frac{1}{2}$ inches at the base. Four windows near the top of the tower face the cardinal points: they are 3 feet $10\frac{1}{2}$ inches in height, 1 foot $4\frac{1}{2}$ inches in width above, and 1 foot $6\frac{1}{2}$ inches below, and seem to differ from each other in their architectural form. Gordon, in his *Itinerary*, mentions, at the beginning of last century, that "each window is supported by two small pillars;" traces of which are still very evident in one or two of them. Those in the west window are entirely gone. Dr. Wilson supposes* the windows may be modern; but after a careful examination, on the spot, I have come to the conclusion that they were prepared at the same time as the rest of the tower. Besides the four windows, there are three small openings to give light.

'This tower was repaired thirty years ago, when seven human skulls were found within it, lying together. Some of them were of a dark colour, as if they had undergone some process of embalming. Along with these, several long bones were found, some of which had been so recently deposited that they had still their ligaments attached to them.† The tower stands about twenty yards to the SW. of the parish church, which is a modern structure. It is now used as a belfry, and the beadle informed me that it is "pretty well" adapted for this purpose. It also contains the village clock; and the ancient Jouge, or pillory, is attached to it.

'The Pillar-Tower of Abernethy‡ is said to have been built by Nectan III., A. D. 720, in the capital of a Pictish kingdom. The Culdees afterwards had a college there; and in 1273 this was converted into a priory of regular Canons of the Augustine order.'

* *Prehistoric Annals*, p. 595.

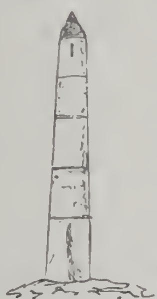
† Small's *Roman Antiquities of Fife*, p. 154, and Appendix F.

‡ The name which the Highlanders give to Abernethy is *Obair Neachtain*, or *Abair Neachtain*, i. e., "the work of Nectan." This Nectan or Nethan desired architects to be sent to build a church, [see Bede] perhaps that of Abernethy. "Fergustus episcopus Scotiæ Pictus,"—i.e., Fergus, the Pictish bishop of Ireland, was in the Roman general council, A.D. 721 [a Binis, t. 3, quoted by Pinkerton, *Inquiry*, II., 267; see also *Statistical Account of Scotland*, vol. x., p. 135.

To this class belong the Pillar Towers of Agharnllee Kilkenny; Kibrie, St. Carriee, Kilkenny; Cashel and Roserea, Tipperary; Castledermor, Kilcallen, Kildare; Fertagh and Kelles, Meath; Swords, Dublin; Furlongh, Killala and Meeleck, Mayo; Kilmallock, Limerick; Monasterboice, Louth; Rattoo, Clare; Seven churches, King's county; Keneith, Cork, and Seven churches, Wicklow.

The Pillar Towers being no longer strictly religious edifices, their original form was modified to suit the fancy of the architect and the prevailing style of the period. The graceful Pillar Tower of Ardmore, is built in square-coursed work of reddish sandstone. The courses vary in thickness from 6 to 10 inches, and the inner face of the building is ordinary rubble-work walling. Its external circumference diminishes considerably with the height, and it has three sets-off externally, with weathered string courses, with sets-off internally. The door is 13 feet from the ground and semicircular at top, and diminishes in height and width internally; and the jambs widen below, with a three-inch torus round them, at their outer angle.

Keneith.



Ardmore.

The Keneith Tower is built of the slate-stone of the locality; and is very peculiar in its external form, having a hexagonal base; each side of which is 10 feet 4 in. in width, and 20 feet in height. Including the round part, the tower is 50 feet 4 inches in height, and it appears to have been left unfinished; or else a portion of the original top has been destroyed. The Tower is built upon a levelled rock, cropping abruptly from the ground. The door faces the west, and is fourteen feet from the ground. The whole has undergone recent repair, and has been provided with iron stairs to the door, and to each of the four stories, which rest upon ledges left in the thickness of the wall; each compartment is 11 feet and 9 inches in height. The diameter of the Tower contracts as the wall rises; and the breadth of each ledge, four inches, increases the splaying of the wall. There is a small bell in the upper stage, supported by cross beams, but it appears to be unused. The walling of the foundation consists of large rough stones, and the

selection of the slate stones has been so good, that it is still in good preservation. The marks of the narrow, flat, and slightly concave chisel-hammer are still clean cut in the stone. The floor of this Tower is on a level with the door, and is supported by a flat arch with a well-hole in the centre, proving the advanced state of the arts at the time of its construction : a chamber is thus formed below the level of the door. The whole erection is admirably executed, and cemented with shell-lime, and the general effect is most graceful. This would be much more apparent, but for the ivy which covers the lower part and has already displaced some of the stones. If this ivy is not removed it will endanger the Tower.*

3. In the third, or Anglo-Saxon period, the Christian religion had been introduced into Ireland. It extends from the fifth or sixth to the end of the ninth century; when the primitive churches were made of mud, and wattled as in Britain. As the influence of the priests increased, they absorbed much of the wealth of the country, and brought architects from the continent, whose constructive skill they employed in preparing the first stone edifices, while they enriched their altars with their most precious ornaments, to increase the splendour of their religious rites. This explains why these establishments were so frequently attacked by their unscrupulous neighbours, and the merciless Danish pirates. By the priests, the Pillar Towers of Ireland were found most valuable erections : near them they resided, and took refuge in them with their most valuable effects; thus following the injunction of Pope Gregory to Augustine of Canterbury, in the sixth century, to adopt any thing good from the Pagan places of worship, for Christian purposes; making such additions, as were necessary or convenient. They accordingly not only occupied such as already existed, but partially built some of these useful erections. These latter may be known by their more modern construction, and by their rounded doorways being cut into a series of recesses, the angles of which are slightly rounded off : also by the addition of a moulding, a mere incision upon the face and soffit of the arch. Other of these modern doorways are decorated with the chevron and bead ornament, as in the gold ornaments found in Irish bogs and in some very antique cinerary urns, dug up from old Pagan and Etruscan cairns and tumuli. In some of the Towers, the pediments, and the repeated columns, and successive arches and various mouldings of the doorway

* In the annals of Munster, still in MS., this Tower is said to have been built in 1015, soon after the battle of Clantarff.

Pillar Tower of Cashel

Door

Lower window

Upper window

become rich and striking; the latter narrowing as they recede into the wall. The capitals of some of the columns are heads, the hair of which is entwined with snake-like animals; as in the Timahoe, and Kildare, the ornaments of which resemble the rich and elaborate decorations on Cormac's chapel Cashel, executed towards the end of the ninth century. It may be allowed that Norman builders executed these doorways, and decorated them with the ornaments and symbols of their religion, like

Donnaghmore. McCarthey's church and Pillar Tower, Clonmacnoise.

their churches and other buildings. As they were in the habit of working in sandstone, these ornamented entrances in the Pillar Towers were usually of this stone. So much was this prized, and so marked is the contrast between the entrance and the Tower, that the former is supposed by that able architect, Mr. R. B. Brush, to have been subsequently inserted.

The Donnaghmore Pillar Tower has the ruins of a church and belfry close to it. This having been more modern, and being used as a place of retreat, has the door elevated, and is without the four upper windows. A crucifixion is over the door (page 564,) of this Tower.

McCarthey's church in the N. W. side of the cemetery of Clonmacnoise, is interesting from its having a Pillar Tower built at the same time, of the same stone, and similar in the character of the masonry. Part of the solidity of the Tower was sacrificed to give full

space to the chaste specimen of the Saxon chancel arch attached to it. This Tower is 55 feet in height, and 7 feet in diameter, and is built with lime. The conical cap is built in the herring-bone style. The door is on a level with the ground, and there are only two small windows near the top, looking to the north and south.

Another Pillar Tower of this class is that of Brechin* in Scotland, and is distinguished for the beauty of the workmanship, and the elegance of its form. It is supposed to have been built in the ninth century; or a century or more earlier than the old church of Brechin, which is supposed to have been founded by Kenneth IV. A. D. 990.† The present church, to which the tower is attached, was added long afterwards.

The Tower of Brechin is built on a gentle elevation, to the north of the old Castle of Brechin, and of the river Esk. It has a contracted view of a fruitful valley on the west; while on the east there is a rich and wide plain, terminating with the Bay of Montrose and the German Ocean.

The stones of which this tower is built have been carefully selected, and formed into square shapes, so modified as to give the circular form to the building; and they are so placed and fitted to each other, for 20 feet from below upwards, and in patches particularly on the east side, as to give a *spiral rising* to the tiers or courses, thus throwing the pressure of the superincumbent mass upon an inclined plane. I am not aware that this remarkable circumstance has ever been observed before; nor does it occur in any of the Irish Round Towers existing. Very little cement had been employed in the building; but the nature of this cement cannot readily be ascertained, as the tower has been thoroughly repaired, and a modern octagon roof erected over it, with angular-headed windows at each of the abutments and spaces, to give it the same architectural character as the modern church, which it joins, and of which it forms the south-west corner. The old tower, previous to the repairs, was eighty-five feet in height: it is now increased by eighteen feet, the height of the new roof. Its extreme circumference at the top is 38 feet 6 inches, sloping outwards to the bottom, where it is 50 feet; the interior diameter at the top is 7 feet 8 inches, at the bottom, 8 feet; the thickness of the wall at the four

* From the Gaelic name Breaichuain, a "brae," or sloping bank.

† Hic est qui tribuit magnam civitatem Brechne domino. Chr. Pict. Kenneth died by treachery (per dolum) A. D. 994. Ulster Annals.

Lith. by H. M. [illegible] 1364

Doorway of Brechin Round Tower.

upper windows is 2 feet 10 inches, and at the doorway 4 feet, including the projection of the door-lintels, which is 2 inches.

There are seven openings in this tower. One of these is the doorway, which faces the west; and there are two oblong openings facing the south and east, to afford light to the interior; and four oblong rectangular windows, near the top, facing the cardinal points. Over all these openings are built large stones, and that over the door of the tower is scooped out, so as to give it an arched form. Those which surround the doorway are large blocks of sandstone, more prominent than the other stones of the building, and sculptured with bas-reliefs. That over the door is the crucifixion; and those on the lintels are the supposed figures of St. John and the Virgin Mary. At the side of the bottom of the doorway, are sculptured, on one side, a crouching animal, and on the other, a monstrous griffin;* and the lozenge ornament in the middle of the door-sill appears to have been filled with tracery. The double rows of button-like ornaments surrounding the doorway bear a resemblance to those upon the Inch-brayoc and Brechin sculptured pillar-stones.† All these figures and ornaments are now much defaced by time.‡ The other stones used in the building of the tower are grey-coloured freestone. Many years ago a second entrance was made, leading to the adjoining church, by removing a number of stones from the tower, which weakened it, and which perhaps accounts for "the large mass, in storms of wind, being seen to sway from side to side."§ There are six unequally sized stories, with platforms of wood, resting upon abutments or supports of hewn freestone, each of which projects from six to ten inches, and bears a strong timber floor. The top of the tower is reached by a series of six ladders. The only 'mason-marks' yet discovered in Pillar Towers are in the interior of this building, and have been delineated by Mr. Chalmers.‖ They are often repeated, particularly about the middle, and are generally cut

* Perhaps symbolical of evil. See Eusebius' Life of Constantine, B. 3, ch. 3.

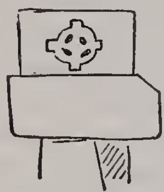
† See *Sculptured stones of Scotland* (Spalding Club,) plates 86 and 138.

‡ This opening was built up in 1847 by order of the Commissioners of Woods and Forests. I am indebted to the accurate Mr. Jervis for this and other particulars.

§ Black's *History of Brechin*, p. 259.

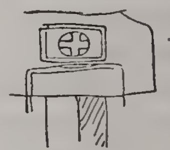
‖ Mr. Chalmers, of Aldbar, was so kind as to allow me the use of a beautiful drawing of the doorway, which is here lithographed on a reduced scale, and which was intended to illustrate a posthumous work of his late able and lamented brother, prepared by the distinguished antiquary Cosmo Innes, Esq.

along the whole length and depth of the face of the stone. Unfortunately the stones of the Abernethy Tower are so much disintegrated that, if any such marks ever existed, they are not now to be found. They have not been noticed in the Pillar Towers of Ireland. (*Archæologia*, v. 34. p. 33.) At the time the adjoining church was built, two bells were placed in the Tower; but the situation was found inconvenient, and they were removed.



P. T. Antrim.

Donnaghmore.



Old Church Fore.

The simple cross over the door of the Antrim Pillar Tower proves its Christian origin, and resembles that over the Church of St. Fechen at Fore; this saint died in A. D. 664. The crucifixion over the Donnaghmore and Brechin doorways proves that they were built at a more modern period.

We can suppose that the watcher on the Tower, on the approach of danger, could collect his friends by the horn, drum, or cymbals; and priests, in more peaceable times, could exhibit their relics, and instruct their followers, from the elevated doorway. These suppositions serve to explain the number of the Towers in unsettled countries, and among a turbulent race of people.

To the third variety of Pillar Towers belong Timahoe, Queen's County; Seven Churches, Smaller Tower Norsida; Kildare, Kildare; Antrim, Antrim; Donnaghmore, Meath; and Brechin, Scotland.

Such are the three classes in which the Irish Pillar Towers may be arranged. The first or original form was most probably erected by Eastern Missionaries, chiefly for religious purposes; and the other two classes were modifications introduced in the course of time, as the buildings were more required as places of defence. As such, they were probably used both before, and after the Buddhist Eastern religion had ceased in the country in which it was first propagated, as they afforded the simplest, and most effectual means of protection; and this explains

their number among turbulent races, as compared with those in more peaceful countries; the few in Scotland compared with the number among the warlike inhabitants of ancient Ireland. They long retained their sacred character, and while used for religious ceremonies, they were found most useful as places of security and defence. There the Priests deposited their most precious effects, as the monks of the present day preserve their books, records, and other valuables in their inaccessible monasteries in Egypt and Syria; on the approach of danger they carry their shrines of gold and silver, and holy relics, into their Towers of safety.

Round Towers which have no connection with religion are found in many countries. In Egypt, where the inhabitants are subject to the depredations of robbers, they resort to such Towers. That

Fig. 1.

Fig. 2.

Fig. 3.

delineated in the margin (Fig. 1) still exists where shepherds hold watch, and in it they deposit all their most valuable goods, with their women and children.* When they have drawn up their rope-ladder they can annoy their enemies with great effect. In border countries where the people were turbulent and warlike, round towers often exist in considerable numbers as the most useful and strongest places of refuge. A good many of them are found on the ghauts, in Hindustan; on the road between Arcot and Bangalore; and skirting the Mysore country. They are from 50 to 60 feet in height, with a door 12 or 15 feet from the ground, reached by means of a ladder: this was drawn up and the door secured. These Towers are often of considerable size, the lower part being used for harbouring cattle. Where the doors are closed, the garrison could easily defend

* L'Egypte Etat modern, quoted by Dr. Kitto.

themselves from their enemies armed with bows and arrows, and the like. In the "*Histoire des découvertes dans la Russe et là Perse,*" there is an account of many round towers, "said by the inhabitants to be the work of very remote times." At Bulgari there is a round Tower called *Misger,** according to Pallas. In the midst of the ruins of *Kasimof*, on the *Oha*, which falls into the *Volga*, is a round and elevated Tower called in the language of the country *Misguir.*† In the *Kisti* and *Ingushti*, very ancient nations of the Caucasus, most of the villages have round towers.‡

In Rajputana there were numerous round insulated Towers, thirty or forty feet in height, built on commanding eminences, whence could be descried the approach of enemies from a distance, and from which the garrison were enabled to alarm the country. The only entrance to these Towers was by a small doorway 12 or 15 feet from the ground. This was reached by means of a ladder, which was pulled up in times of danger, and the door closed, and secured; thus out of danger, a few could repel a great many. The enemies most dreaded were Pindaree horsemen; and the Towers afforded a ready and secure retreat to the husbandmen, who could use their matchlocks with great effect from the loop-holes with which the tower was pierced. Even when the door was reached and driven in, the defenders had the different stages to retire to, which thus became so many successive fortresses. Some of these were flanked with breastwork; and such facility did they afford for refuge, and such encouragement to continual warfare, that many of them were destroyed by order of the English Government.§

The late Colonel Stacy met with a characteristic example of the use to which these Towers were often put, in his advance on Cabul from Candahar;—"near the camp, within one hundred yards of the road, on the slope of a hill, there was a small but high Tower, with only one

* A corruption of Muzgi, مزگي which signifies 'to make a holy fire burn bright.' Richardson.

† Guttorn.

‡ Ib. p. 145, referred to by Dr. Petrie, p. 29.

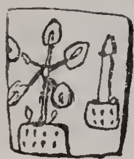
§ Cap. Western, B. E. told me he had blown up some thirty or forty, to the great benefit of the inhabitants, as they were no longer required, and they had become harbouring places for robbers.

door about eight feet from the base, in which three men were concealed. They suffered the column, and some of the baggage to pass, and then opened their fire. Fortunately a guard over some stores was passing at the time, and four men were sent up to the Tower, which appeared to have no floor; for they placed a musket inside, pointed upwards, and brought down one of the assailants the first shot. Fearing the others might escape, a fire was kindled in the doorway below, which filled the inside of the tower with smoke, and soon obliged the other two to descend; one was killed close to the door, and the other was shot in attempting to escape.*" So well suited are these towers for defence, that the *Block-houses*, which were erected during the late rebellion in Canada, (1838 and 1839) were upon the same principle—modified so as to be constructed of the materials of the country. In Canada the retreat was supported upon logs of wood, so as to raise the house 8 or 12 feet above the ground. The only entrance was by means of a ladder, which was then drawn up and the trap door closed; and the floor and walls being loop-holed, any one approaching was exposed to musketry.

The Buddhist missionaries changed their symbolical Pillars (lâts) to hollow cylinders or Pillar Towers, to protect their persons and the precious relics which they carried with them to distant countries, and valued so highly. The remains of some of these are still to be found in different parts of Hindostan. Tennent states that the pagodas of Blyars, of the Circars, are chiefly buildings of a cylindrical or 'Round Tower', shape; with their tops either pointed, or truncated at the summit, which frequently bears a round ball on a spike, to represent the sun.† Hanway, in his travels in Persia, states that there are four round temples of the *Guebres*, or worshippers of fire, "about thirty feet in diameter, and about 120 feet in height.‡

The sacred nature of these Pillar Towers in Buddhist countries explains why they are sometimes delineated upon coins, with other sacred objects; as in the accompanying drawing, in which the "*Tower of Deliverance*," and the sacred tree are both represented as springing out

* Narrative of Services, p. 205.
† View of Hindostan, vol. II. p. 123, or vol. VI. p. 133.
‡ Ibid, p. 137.



of a sacred pot.* The second figure annexed is that of a Pillar Tower in the Island of Ormus, in the Persian Gulf. Sailors often erroneously consider it to be a light house, without any lantern.†

Near the Tower of safety in former times was the chapel (*urbaria*) or the place of worship, which consisted of a quadrangular building; and the solid cairn (*dagoba*) in which the relic of the body of a saint, or good man, was buried. The Pillar Tower, protected the priests, their most precious effects, and the relics employed in worship. Fa Hian, who travelled in Hindustan in the beginning of the fifth century for the special purpose of studying the Buddhist ritual in its original seat, at the time it was the prevailing religion of India, has left us an interesting account of his travels in that country.‡ He informs us that in his time, as indeed in Buddhist countries of the present day, the relics of the great Buddhist saints, were considered of inestimable value; and when a Temple or city possessed such a treasure, its security was ensured by every possible means. Fa Hian informs us that *Nakie*, a city east of Ghuzni, possessed a portion of the skull of Buddha (*Foe*), for which the king of the country entertained the greatest veneration. The relic was gilded, and covered with the most costly ornaments; and so much afraid was he of its being purloined, that eight chiefs of the principal families of the kingdom, had each a seal, which they set on the gate of the *chapel*, or "*Tower* of deliverance." Early in the morning the eight proceeded to verify the seals, and then opened the gate. On entering, the chief washed his hands, took up the venerated skull-bone of Buddha, conveyed it to the chapel, and secured it, under a bell-

* In Major Cunningham's Bhilsa Topes, Plate 32, No. 2.

† London Illustrated News for 3rd January, 1857

‡ The Journal of this pilgrim was translated from the Chinese by M. M. Remusat, Klaproth and Landresse; and reprinted in Calcutta, in 1848, with interesting notes and illustrations by J. W. Laidlay, Esq.

glass, upon a round stone table, placed on a throne adorned with all kinds of precious ornaments. Every day at sunrise, the attendants of the chapel ascended the pavilion, beat the great drum, sounded the conch, and struck the copper cymbals, to collect the inhabitants for worship. The king, and the assembled people offered up flowers and perfumes, and performed their devotions. Each one, according to his rank, placed the relic upon his head, and then retired to his ordinary occupations. The skull bone was then taken back to the chapel, or 'tower of deliverance' and secured.

The most magnificent tower in the entire continent of India, was constructed by *Foe leon sha*, in honour of Buddha; in this his begging pot was preserved, an indispensable and characteristic utensil of the Buddhist recluse. We are informed that the possession of such a treasure induced the king of *Yueti* to invade the country with a powerful army, to gain possession of this sacred pot.* In this case the tower was a place of great strength: but such was not always the case, as the towers were of various sizes and forms, according to fancy, or the purposes for which they were intended. They had often seven, nine, or twelve stories, corresponding to fortunate numbers, or to the twelve *nidans* or conditions of relative existence. In some cases they were erected on spots made sacred by some holy action, as the receptacle of some relic of a saint. When such a Tower was erected by any one directed "by great faith, and the impulsion of a well directed heart," who then established "the ceremonies and worship," he was promised re-birth among the gods;† the highest state of Buddhist reward in the next world. This tenet is stated to be taken from the sacred book, "of the names and titles of the eight great divine towers." According to this authority, there are upon the earth and in the heavens, a great number of these Towers. This explains why king *Ni Kia* erected a tower upon a sacred spot, more than forty toises high (about 400 English feet); and adorned it with all manner of precious things. So that all who beheld it, and the Temple, admired their beauty and magnificence, to which nothing can be compared.‡

It was considered by the Buddhists to be of the greatest importance to visit and join in worship at the shrines of these sacred Temples.

If such Towers existed in considerable numbers, and of such a size

* Ibid, p. 76. † Ibid, p. 172. ‡ Ibid, p. 74.

in Hindustan and other countries where the Buddhist religion prevailed, we must expect to find them still remaining. Such is the fact; and a few of them may now be mentioned. Lord Valencia, gives the drawing of two round towers, he saw near Bhaugulpore in Bengal,* which resemble those in Ireland: the door being elevated above the surface of the ground, and the tower provided with four large windows near the summit, and a stone roof.† Captain Smith has delineated another such Tower, which he found at Cole near Allyghur.‡ These Towers were never common among the peaceful inhabitants of Bengal, and many were most probably destroyed by the persecuting Brahmans and fanatical Mahommedan conquerors of Hindustan.

The Buddhists of Hindustan were originally separatists from the Hindu religion, having rejected caste, and the sacred books of the Hindus, &c., while they adopted a pure system of morals, and believed that no good work was equal to that of spreading their religion to the uttermost extremity of the world; and such was the enthusiasm of these Asiatics, that in a few centuries they converted a large portion of the inhabitants of Asia to their faith. They even penetrated at an early period to Africa and Europe; extensive traces of their presence are still found in the British Islands, and a Buddhist community still exists in European Russia.§

In these distant countries, and among such different races of people, they found it necessary to vary their forms and ceremonies, to suit the fancy and circumstances of the people among whom they resided; this explains the contradictory nature of a few of their precepts, and the obscurity of some of their doctrines.

On reaching Europe, the enthusiastic Eastern missionaries soon

* Travels in India.

† These Towers are often referred to, but I have in vain made various efforts, when in the neighbourhood, to procure drawings of them. They are the same referred to by the Marquis of Hastings in his private journal. He states there are two insulated Towers near Bhaugulpore, which have some resemblance to the Round Towers of Ireland; but "they are not above half the height. The door was on a level with the ground. Evidently those which I saw to-day were of no considerable antiquity."* These cannot be considered as examples of the Pillar Towers; and as the late Magistrate of the Bhaugulpore district could not find any trace of them, I suspect his Lordship must have made a hurried sketch, or the engraver took great liberties with the drawing which he got. The late distinguished Jurist E. A. Samuells, C. B., long the able Magistrate of the Bhaugulpore district, could not find any traces of them.

‡ In William Benham's Iberia Celtica, v. 2, p. 200.

§ In Chambers's Journal for August, 1858.

* Vol. I. p. 95.

visited the beautiful British Islands, and at an early period acquired the confidence of the Celtic inhabitants of the North East of Scotland and Ireland. In both these countries many specimens of their architecture exist;—in the engraved stones of Eastern Scotland, and the Pillar Towers of Ireland; to execute which, a religious purpose alone would urge such a population as inhabited Scotland and Ireland, at the time of their erection. These Buddhist missionaries were well known in Europe, and are repeatedly referred to, by the primitive fathers of the Church, in the first centuries of the Christian era. Clement of Alexandria, who lived at the close of the second century, had heard of the monastic practices, and peculiar monuments or topes of the Buddhists. He mentions the Brachmani, and the Sarmani who worship Buddha, or Bouth, whom they honour as a god: and about the middle of the following century, Porphyry repeats information alluding to Buddhist practices, from Bardesanes, who obtained it from Indian envoys sent to Antoninus. "There are," he writes "two divisions of the Gymnosophists, Brachmans and Sarmani." The former are so by birth, the latter by election, consisting of all those who give themselves up to the cultivation of sacred learning; they live in Colleges, in dwellings, and temples constructed by the princes, abandoning their families and property. They are summoned to prayer by the ringing of a bell, and live upon rice and fruits." Cyril of Alexandria mentions that the Samanæans were the philosophers of the Bactrians, showing the extension of Buddhism beyond the confines of India; and St. Jerome, who like Cyril, lived at the end of the fourth and the beginning of the fifth century, was acquainted with Buddhistical legends; for he says that Buddha was believed to have been born of a virgin, and to have come forth from his mother's side. From Cyril of Jerusalem and Ephraim, who wrote in the middle of the fourth century, we learn that Buddhism tainted some of the heresies of the early Christian Church, which the latter terms the Indian heresy. Their accounts demonstrate that the Buddhism of India was known to Christian writers between the second and the fifth century of our era;* but as no *Towers* of *Safety* were erected in any part of Europe, except in Ireland and Scotland, we could not suppose that the primitive Christians were the first architects.

The Pillar Towers were erected by artists from the East, with a

* In H. H. Wilson's Works, v. 2, p. 313, et seq.

degree of skill that has never been surpassed, and at a time when the inhabitants of Ireland and Scotland were in a state of great rudeness. The towers were well adapted for defending their persons and effects from the rapacity of the warlike chiefs among whom they dwelt. From the elevated windows they could descry their enemies; on which they raised the entrance ladder, shut and secured the high door, and gave warning to their friends at a distance.

The able and enthusiastic pagan architects may have refused to construct any other sacred buildings than their sacred Pillar Tower; as they appear to have erected the standing stones only, in the north-east of Scotland. These at first bore only the pagan symbols, to which conquering races afterwards added the symbols of the Christian faith. In like manner in Ireland, at first a sacred pillar was erected, on which the national ornaments and Christian emblems were placed, in a more advanced state of the arts. In no other erections of the earlier period was the same architectural superiority exhibited, as sacred forms were alone considered worthy of the exertions of the architects.

In peaceable times, the missionaries collected their followers by sounding the horn or beating the drum at stated times; and from the elevated doorway, they performed their religious ceremonies and exhorted the people, as they did in Scotland while standing by the side of the sacred erect stones bearing pagan emblems, to which the Christian cross appears to have been afterwards added. It would be difficult to construct any other building that would possess so many advantages as the Pillar Tower.

From the above facts I conclude—

1. That the Pillar Towers were first erected in Asia as a religious symbol; and the form was modified in foreign and unsettled countries in order to afford protection to the persons, the relics, and other valuable effects of the builders.

2. That eastern missionaries erected those sacred symbols in Ireland, as places of refuge and observation, from whence they could alarm their friends by the blast of the horn, the clang of the cymbal and the roll of the drum during the day; and by waving a torch from the apertures at the top of the Tower at night.

3. These Towers were found so useful that they were adopted by conquering races, who decorated them with their national ornaments, and Christian symbols.

PROCEEDINGS

OF THE

ASIATIC SOCIETY OF BENGAL,

FOR NOVEMBER, 1864.

The Monthly General Meeting of the Asiatic Society of Bengal was held on the 2nd instant.

Baboo Rajendralal Mitra, Vice President, in the Chair.

The Proceedings of the last meeting were read and confirmed.

Presentations were announced—

1. From Baboo Rajendra Mullick, a young Emu, and a mounted specimen of a crown pigeon.

2. From L. B. Bowring, Esq., a photograph of an Inscription on a rock at Taikal.

The following letter accompanied the presentation:—

"BANGALORE, 17TH SEPTEMBER, 1864.

"MY DEAR SIR,—I have the pleasure to send you a photograph of a curious rock inscription at Taikal, a few miles from the Colar Road Station of the Bangalore Branch Railway. It is in Teloogoo, which is the prevailing language in the Colar District of Mysore; but it has been deciphered with difficulty, and the translation given overleaf is rather the general purport than a literal rendering.

"At the time mentioned, 1438 Saliváhan, the Colar country was apparently under the rule of the Anagundi kings, and it is probable that the Deva Raja referred to in the inscription was of that Dynasty.

"Yours truly,

(Signed) "L. B. BOWRING."

TRANSLATION.

"The order of Deva Raya, the chief ruler, to his next in authority Gopa Raja, son of Kanthappa Raja Wodiar, dated 1438.

Banda Baliaka Naik.

Allarpa Naik.

Bhungeeda Naik.

"These three are counsellors of the said Gopa Raja, their household god being Vardharaj Devaru; they conducted their domestic affairs in the form of a procession in the service of that god.

"At this time it was reported that a tiger had killed a cow in the vicinity. Then a hero, named Pratap Singh, visited Gopa Raja, with his followers, during the procession in honor of the god. At the request of Gopa Raja, he hunted and slew the tiger, for which service, Deva Raya, on the recommendation of Gopa Raja, granted to the said Pratap Singh, in the name of the god, 93 wet lands and 13 dry lands near the village of Coomsee."

Under the figure of a Tiger:—

"This shásanam is engraved by Kallukote Tirumallaga. 93 wet lands and 13 dry lands have been granted for slaying the tiger by order of Deva Raya. The said wet and dry lands have been obtained by the favor of Vardharáj Devaru."

3. From J. Beames, Esq., two silver and four copper coins.

4. From C. A. Elliott, Esq., Rubbings of Inscriptions at the foot of some Jain Images in the Hoshungabád district.

Mr. Blanford exhibited some specimens of flint implements of the "early stone period," found at St. Acheul, near Abbeville, which he had lately received from England. He pointed out the resemblance of their general form to that of the stone implements from Madras exhibited a few months since by Mr. Oldham, and gave a brief description of the deposits in which these implements were found. He specially pointed out that the evidence of the immense antiquity of man rested not on mere vague calculations of the rate at which alluvial deposits were formed, as had been recently stated, somewhat dogmatically, by an eminent mathematician, who was evidently but slightly informed on the enormous changes that have been effected in the physical Geography of Western Europe since the formation of the deposits in which these implements were found. To suppose that the

Somme Valley had been hollowed out in a period of six thousand years, or even six thousand years two or three times multiplied, would be utterly at variance with all that we know of the eroding action of rivers; and the Somme Valley only offered one instance out of a great number in which broad river valleys must have been formed since man lived on the earth. Some persons without practical acquaintance with the forms of stones naturally fractured, had doubted whether the flint implements were really of human manufacture, in spite of all the evidence of design afforded by their uniformity, and the number of fractures by which that unformity had been attained; and the absence of human bones from the deposits containing the flint implements had been much commented on, as being adverse to the view of the human origin of the flint knives. It might be satisfactory, therefore, to such persons to know, that within the last few months a considerable number of human bones, including a human skull of very depressed form, a sacrum, portions of jaws and other bones, had been disinterred from the old flint-knife gravels of Moulin Quignon, not by the questionable agency of workmen, but by M. Boucher des Perthes and a number of French Geologists, whose names were a sufficient guarantee for the genuineness of the discovery. Mr. Blanford concluded by reading a paragraph from the August number of the Annals and Magazine of Natural History, which gave an account of these discoveries.

Mr. Blanford then drew the attention of the Meeting to some portions of a semi-fossil human skull, found some years since, unlabelled and without any note of locality, in the Society's Museum. It consisted of the occipital and parietal bones and a portion of the frontal, with portions of upper and lower jaws, and was filled with a mass of shells of the genus Unio, also semifossilized, and loosely connected together by calcareous infiltration, in a sandy matrix. The Unio was of a living species, but that fact would afford no indication of age, as the fresh water shells which accompany the bones of extinct Mammalia in the Nerbudda alluvium are all of living species. Mr. W. Theobald had found this specimen some years ago in the Museum, shortly after his return from the Nerbudda Valley, and then stated that the matrix of the specimen resembled that of certain of the Nerbudda bone deposits. The specimen had been laid by, and had

only been refound lately after much search. Mr. Blanford now exhibited it to the Meeting, in the hope that some of the older Members of the Society might be enabled to throw some light on its history. The skull, so far as could be judged from the fragments preserved, was well formed, and not unlike that of some of the recent native skulls in the Society's Museum. Until something was known of its history, no inference could be drawn as to its antiquity.

Mr. Blanford then read to the Meeting a note by Professor John Phillips, of Oxford, on the supposed Spiti fossils in the Oxford Museum, prefacing the reading with the following remarks:—

"It will be remembered by those Members who were present at the December Meeting of the Society last year, that Mr. Oldham read a paper 'on the reputed Spiti fossils,' in the Society's Museum, in which I was called to account for having rejected on insufficient grounds the genuineness of certain of the fossils in that collection, more especially a few species of Ammonites which differed from those forming the majority of the collection in apparent geologic age, as well as in matrix, &c.; while they were absolutely identical in species, matrix, and every other point with the well known Lias fossils from Whitby in Yorkshire. Some of them were figured as forming part of Dr. Gerard's Spiti collection, by Mr. James Prinsep, in the *Gleanings in Science* of 1831, and again in the 18th vol. of the Asiatic Researches; but as this was the only evidence that I could discover of their genuineness, and as similar fossils had not been discovered by any other collectors in Spiti or elsewhere in the North Himalaya, I considered it probable that the specimens in question had been accidentally intermixed with the genuine Spiti fossils subsequent to the receipt of the latter by the Society. Mr. Oldham endeavoured to combat this view by adducing the fact that fossils of the same species and similar in character to those rejected by me existed in the Oxford Museum, where they were labelled as Spiti fossils; and that it was absurd to suppose that a similar accidental intermixture of Whitby and Spiti fossils had taken place at Oxford and Calcutta.

"In replying to Mr. Oldham's remarks, I pointed out that the Oxford specimens could not be received as independent evidence, unless it could be *proved* that they had been despatched by Dr. Gerard to England as an independent series, and under circumstances which

rendered it impossible that the supposed intermixture had been effected prior to their despatch. Admitting the fact that the Oxford fossils had been received in England some time previous to the publication of the 18th Volume of the Asiatic Researches, I stated that I had been unable to find any record of the date of the actual receipt of the fossils by Dr. Buckland, or of that of the Society's series by the Society: If these two dates could be ascertained and compared, it would then be seen whether the evidence of the Oxford fossils could be regarded as that of an independent series or not. I asked Dr. Oldham whether he had any such dates, to which he did not reply at the time, but afterwards rose and said that he had not his notes with him, but that he knew that the Oxford series was received at Oxford before the Asiatic Society had received theirs. Thinking, however, that Dr. Oldham might possibly be mistaken on this head, and with a view, if possible, to settle this very important point of evidence, I wrote to Professor Maskelyne, to ask him to ascertain whether there existed any record of the actual date of receipt of the Spiti fossils at Oxford, and briefly stating the question at issue, which that date was required to decide. Professor Maskelyne very kindly communicated my letter to Professor John Phillips, and the result is the note which I now read to the society.

" '*Notes on Himalayan Fossils in the Museum at Oxford; June 2nd*, 1864. *By Prof. John Phillips.*

'About 30 years since, I sent from York to Calcutta a considerable series of the fossils of Whitby and some other tracts. The specimens were selected from the duplicates of the Yorkshire Philosophical Society, and were presented by that Institution to some individual of position in Calcutia, whose name I cannot remember (it *seems* to me to have been Patterson), but could find out. Whether the collection was carefully kept separate at Calcutta, I know not; but some years afterwards, on being shown in England a specimen of *A. communis* said to be 'from the Himalaya,' I at once conjectured that the Yorkshire collection *might* have given forth this offset so like—so absolutely like—in form, colour, and accompaniments of shale or ironstone. The same astonishing resemblance occurs in regard to these specimens in the Oxford Museum, especially in regard to the *Ammonites communis* and *A. bifrons (Walcottii)*, which are very common at Whitby.

'On the other hand, the other fossils in this collection do not offer any especial analogy to Yorkshire types; some are of Oxfordian shapes, and of the Belemnite in particular, it is unknown in Yorkshire, but a good deal like some found in the South of England, *as to form*, not, I think, as to conservation, &c.

'Among the fossils we note as of Liassic age, *Ammonites communis.*

'*Ammonites Bifrons (Walcottii):* such occur at Whitby. The variety of *A. communis* called *crassus*, is found both at Whitby, and in this series, from the Himalaya!

'*Pachyodon Listeri* in plenty. It is not quite like ordinary English specimens.

'Small *Spirifera* of the Liassic type, such as occurs in South of England, not in Yorkshire.

'With this *Spirifera* in *plenty*, occurs:—

'*Rhynchonella* of the types *concinna* and *obsoleta.*

In separate masses, ——

'*Avicula* like *Braamburiensis.*

'*Astarte.*

'*Trigonia* of a type near middle and top of Bath Oolite series, not quite like any English form, and separate.

'*Belemnites* of the group *B. Sulcatus*, Miller, probably of Oxford clay.

'Palœozoic Fossils also occur, including

'*Producta antiquata.*

'*Spirifer* 1.

" 2.

" 3. '*Attenuata*

'*Strophomena.*

(Sd.) 'JOHN PHILLIPS,
Oxford.

'2*nd June* 1864.'

"It would appear from this note, that Professor Phillips entertains some doubt on the genuineness of the Oxford fossils, but as he omits to give the date, which is especially required to settle the question, I am still uncertain whether any record of it exists. Dr. Oldham has, however, given us to understand, that he possesses such evidence of the dates both of the receipt of the Society's and of the Oxford collec-

tions, as will tend to settle the point, and it will materially aid in the elucidation of the question if Dr. Oldham will communicate these, for record in the Society's proceedings, in order that their authenticity may be thoroughly sifted, and the question of genuineness, if possible, thereby set at rest."

Babu Rajendralal Mitra made the following remarks on four undescribed coins, which were exhibited by him.

"Since the last meeting, I have had occasion twice to examine the Cooch Behar trove at the Mint, in order to select a few sets of coins for a friend; and while so employed, I discovered two varieties of coins, which had before escaped my notice. Both of them appear to me to be unknown to numismatologists. I take this opportunity, therefore, to submit them to the inspection of the meeting: one of them has on the obverse the name of one Sultan Ruknuddin Kaikaus, the son of a Sultan, and the grandson of a Sultan; and on the reverse, that of the Khalif Mostasim. The margin of none of the four specimens that I have seen is perfect, but on one of them the words *Sulsh* and *Satamáyá*, or "six hundred and three," are distinct, with a word in the middle, which appears to me to be very like *Tasaayin* or ninety. On a second, the words *Sanch ahad*, "In the year one," are clearly legible, and traces exist of *Tasaayin Satamáyá*. The third specimen has *Tasaayin* or "ninety," the rest being illegible. Reading the dates with the help of each other, I take them to be 691 and 693 respectively. The place of coinage, I read with some doubt to be *Sonargaon*. It follows hence, that the king who issued these coins must have lived in the last decade of the 7th century, and exercised sway either at Delhi or Gour. Now it is well known that Nasiruddin Bagora, the second son of Balban, was in undisputed possession of Bengal from the Hejira year 681 to 698, or A. D. 1282 to 1299; and our Kaikaus, therefore, could not have been a King of Bengal at that time. At Delhi, Ghyasnddin Balban died in the year 1286, leaving his Empire to his grandson, Kai Khusro, son of Muhammad. But his nobles set aside his will, and raised another of his grandsons, Kaikobad, son of Nasiruddin of Bengal, to the throne. That dissolute prince reigned for only three years, and was succeeded by Jellaluddin Firuz, the Khilji, in H. 687, or A. D. 1288. Ziaa-i-Barni, the historian and contemporary of this Firuz, says, that during the last illness of Kaiko-

bad his Moghal Omrahs got possession of his only son Kaimurs, a boy of three years of age, and proclaimed him King under the title of Shamsuddin. They were, however, unable to maintain their ground, and in three months Firuz mounted the throne, and subsequently caused the young prince to be put to death. This statement has been repeated by all subsequent historians, except the author of the Mirat al'Alum, who, according to Mr. Thomas, changes the name of the prince, from Kaimurs to Kaikaus; and it is to this prince that I feel disposed to assign the coin under notice. Its shape, size, and style of writing are very like those of the coins of Kaikobad, its legend is *mutatis mutandis* the counterpart of that of the other, and its reverse has the name of the Khalif Mostásim, given in identically the same words, as on the coins of Balban and Kaikobad, while there is a strong family likeness in the names of Kaikaus, Kaimurs, Kaikobad and Kai Khusro.

The dates of the coins, however, are opposed to this assignment. The units "one" and "three," are perfectly clear, and they will not admit of our bringing the coins which bear them to the year 687, when Kaimurs was proclaimed king, even if we doubted the term for 90 *(Sasayin)* and read it 80 *(Samanin.)* The title also is opposed to my assignment. According to a contemporary historian, the prenomen of Kaimurs was Shamsuddin, while that of the Kaikaus of our coin is Ruknuddin. These difficulties, however, may be explained away. There are on record several instances in which Muhammadan Sovereigns have appeared under different prenomens at different times, and this may be one of them; and the discrepancy in the dates may be due either to the prince having lived as a fugitive much longer than Ziaa-i-Barni admits, or to a desire on the part of Nasiruddin, Governor of Bengal, to continue his allegiance to his grand son Kaimurs, even after his deposition, and possibly after his death; for he could not readily recognize the usurpation by Firuz of an empire which belonged to his family for three generations. Should this theory of mine be untenable, it will be for others to decide who this prince was, whose coin we have now on hand.

Obv. "Ul Sultan ul A'zam Ruknuddunia-o-din Abu Mozaffar Kaikaus Sultan ibn ul Sultan ibn Sultan." Rev. "Ul imam ul Mustásim, Amir ul momnin Maz Zarb házeh ulsikka Saneh sub tasaayin satamaya."

The second coin I have to notice, has the name of one Ali Shah on the obverse. His prenomen was Alauddin, and he calls himself the Alexander of his age, *Sekander uljeman;* I have found several specimens of his coinage, but none sufficiently perfect to give me his date in full. The only word legible is *Sabaamaya*, or "seven hundred." Traces also are visible of a word which may be taken for *arbayin*, or forty, but what the unit was I cannot make out. The place of coinage was Lucknouty. Assuming upon those premises that it is a Bengal coin of the 5th decade of the 7th century, I attribute it to Aly Mubarik, the officer of Kaddar Khan, who proclaimed himself king of Bengal, in 742 Hejira, or A. D. 1342, under the prenomen of Alauddin. He was assassinated, after a reign of a year and five months by his foster brother Hajy Ilias.

The legend on the coin is as follows:—Obv. "Ul Sultan ul Azam Ala ul dunia-o-din Abul Mozaffar Ali Shah ul Sultan." Rev. "Sekander ul jeman ul *** zarb ul Sikka Lakhnauti, Saneh Arbayin * Sabamaya."

I take this opportunity to exhibit two Assam silver coins, placed at my disposal by Col. Guthrie. They bear the names of Surjanáráyana Deva and Surja Deva Chakradhvaja Sinha, with the Saka years 1570, 1575, or A. D. 1648 and 1653. They were the earliest Hindu Kings of Assam, but their dates had hitherto remained unsettled. James Prinsep, following the *Assam Burunji* of Holiráma Dhekial Fukan, placed the first Hindu King of Assam, Chakam or Jayadhvaja Sinha, in the year 1665, with a mark of interrogation after it, and a Chakradhvaja Sinha in 1621, immediately below him.

The *Assam Burunji* of Rádhánátha Bor Borua removes Chuhunmung alias Surjanáráyana the first Hindu Raja, to the year 1497; and then, after two Burmese names, has a Chuhingfa, alias Surjanarayana, who after two Burmese successors was followed by a Chutamla, alias Jayadhvaja Sinha, in 1658, and a Chupangmung, alias Chakradhvaja, in 1663. Chakam, alias Jayadhvaja Sinha, is said to have defeated a general of Aurungzeb, and his era, therefore, must be subsequent to 1658, and he is evidently identical with the Surjadeva Chakradhvaja Sinha of our coin, who commenced his reign before 1653. His immediate predecessor was Surjanáráyana, who was probably the first convert to Hindu faith; for the first prince of that name in Rádhá-

nátha's history is evidently a mistake. In his coins he invokes both Hari and Hara for his patron divinities.

The legends of the two coins, are, 1st, of Surjanáráyana.

1st Area.—Sri Sri Hari Haracharana paráyanasya.

2nd Area.—Sri Sri Surjanáráyana Devasya Sáke 1570.

2nd, of Surjadeva.

1st Area.—Sri Sri Siva Rámagana paráyanasya.

2nd Area.—Sri Sri Surjadeva Chakradhvaja Sinhasya Sáke 1575.

A letter from Mr. Carlyle, announcing his resignation of the Curatorship, after the Dussehra holidays, which has been accepted by the Council, was recorded.

The following resolution was proposed by the Council, expressive of the Society's recognition of Mr. Blyth's services:—

"On the eve of transferring the Zoological collections of the Society to Government, to form the nucleus of an Imperial Museum of Natural History, the Society wishes to record its sense of the important services rendered by its late Curator, Mr. Blyth, in the formation of those collections. In the period of 22 years, during which Mr. Blyth was Curator of the Society's Museum, he has formed a large and valuable series of specimens, richly illustrative of the Ornithology of India and the Burmese Peninsula, and has added largely to the Mammalian, and other vertebrate collections of the Museum; while by his numerous descriptive papers, and catalogues of the Museum specimens, he has made the materials thus amassed by him subservient to Zoological science at large, and especially valuable to those engaged in the study of the vertebrate faunas of India and its adjoining countries."

The resolution, being put to the vote, was carried unanimously.

Letters from the Rev. J. Cave Browne, Lt. Col. A. Fraser, and Mr. T. Dickens, intimating their desire to withdraw from the Society, were recorded.

The following gentlemen, duly proposed at the last meeting were balloted for, and elected Ordinary Members;—

Baboo Bhoodeb Mookerjee.

H. H. Locke, Esq.

The Hon'ble J. B. Phear.

Lieut. Col W. D. Short, R. E.

C. W. Hatton, Esq.

The following gentlemen were named for ballot, as ordinary members at the next meeting.

W. Anderson, Esq., proposed by Captain W. N. Lees, seconded by Mr. H. F. Blanford.

H. Dunlop, Esq., proposed by Captain W. N. Lees, seconded by Mr. Geoghegan.

J. C. Sarkies, Esq., proposed by Mr. Woodrow, seconded by Mr. H. F. Blanford.

D. R. Onslow, Esq., proposed by Mr. Sandeman, seconded by Mr. H. F. Blanford.

J. H. A. Branson, Esq., proposed by Mr. Heeley, seconded by Mr. Wheeler.

Whitley Stokes, Esq., proposed by Mr. H. B. Medlicott, seconded by Mr. Heeley.

R. J. Richardson, Esq., C. S., proposed by Mr. H. F. Blanford, seconded by Mr. Heeley.

E. S. Robertson, Esq., C. S., proposed by Mr. Heeley, seconded by Dr. Colles.

E. T. Atkinson, Esq., C. S., Jaunpore, proposed by Mr. Heeley, seconded by Mr. H. F. Blanford.

The Council reported that they had elected Colonel C. Douglas to the Meteorological and Library Committees.

Communications were received :—

1. From E. Thomas, Esq., A continuation of his paper on Ancient Indian Weights.

2. From Baboo Gopee Nath Sen, Abstract of the results of the Hourly Meteorological Observations, taken at the Surveyor General's Office in July and August 1864.

3. From the Secretary Antiquarian Association of the Central provinces :—

I. A Memorandum on some of the principal Hill Tribes of the Satpoora Range.

II. Notes on the Gurjat State of Patna, by Major H. B. Impey, Deputy Commissioner of Sumbulpore.

III. A letter from the Officiating Deputy Commissioner of Belaspore to the Commissioner of the Chuttesgurh Division, containing a History of the Hey Hey Bunsee Dynasty of Ruttenpore.

4. From Captain H. H. Godwin-Austen, F. R. G. S., description of a mystery play as performed in Ladak, Zaskar, &c.

The Librarian submitted a report of the accessions to the Library since the meeting held in July last.

Captain Godwin-Austen's paper was read by the Secretary. He stated that mystery plays were enacted in the principal monasteries of Ladak, in the spring and autumn of each year. He saw the performance in the monastery of Hinnis, situated in a ravine opening on the Indus, a day's journey above Leh. Captain Austen describes the monastery and its furniture at some detail, and proceeds to analyse the performance, which commenced with a dance to music of masked figures, in an extraordinary costume, with the device of a skull upon the breast; each dancer also held a ladle, made of a human skull, with long streamers of silk attached to it. To this succeeded other dances, the masks being frequently changed; one set had the third eye in the centre of the forehead, which is the mark of a deity; others were jesters or harlequins; others represented the Court of Indra; and the scene closed with a "dance of death," the performers in which were got up to represent skeletons. Captain Austen's paper was illustrated by stereoscopic views of the various *tableaux*, taken by Captain A. B. Melville, and which had been previously exhibited to the Society, and was accompanied by a translation of a MS. obtained in Ladak, and furnishing directions to dancers.

Captain Lees said,—"I was asked a question at our last meeting by the Hon'ble George Campbell, whose attention had been attracted by the following passage in Purchas' travels in India during the reign of Akbar:—

"'In his Treasurie of Agra are in gold of Seraffins Ecberi (which are ten Rupias a piece) three score Leekes. Of another sort, which are one thousand Rupias each, twentie thousand pieces; and ten thousand of another sort, halfe the value. Of Toles (euery tole is a Rupia of siluer, and ten of those toles is the value of one of gold) thirtie thousand. Of another sort of ten toles, five and twentie thousand; of another sort of five toles, fiftie thousand.'

"The learned gentleman wished to know, with reference to the proposed introduction of a gold currency into India, whether the coin here alluded to under the name *Seraffin*, the value of which would

appear to have been Rs. 10-0-0, could have been the original of our English Sovereign. At the time, I stated that no value could be placed on any deductions made from foreign words occurring in the work alluded to, in consequence of the barbarous style of the Author's or Editor's Orthography; that I believed that by the word *Seraffin* the author meant Ashrafi; but as, notwithstanding the elaborate work of Abu'l Fazl, there was considerable doubt regarding some points connected with the currency of India in Akbar's time, I promised to make enquiry on the subject. Enquiry, however, has resulted in little more than a strong confirmation of the opinions I expressed in this room a few months back, regarding the very great danger of too general an application of the Roman alphabet to oriental languages. It would be impossible, I think, to find a better illustration of the mischief that might result, if the Romanizing principle were carried beyond its legitimate limits, than is contained in this work, one short passage of which I will read to the meeting.

"'*Garcias ab Horto* writes, that 'The Mogors had possessed the kingdome of Delly: but a certaine Bengalan (rebelling against his master) slue him, usurped his state, and by force of warre added this of Canara also to his dominion; he was called *Xabolam.* This king made his sister's sonne his successor, who was much addicted to Forreiners. He divided his kingdome into twelve parts, or Provinces, over which he set so many captains: Idalcam from Angidaua to Cifarda; from thence to Negatona, Nizamaluco; over Balaguate, or the up-hill country (for Bala in the Persian language signifieth, the toppe, and Guate a hill), Imadmaluco, and Catalmaluco, and Verido, &c. These all rebelled, and captured Daquem their King at Beder, the chief citie of Decan, and shared his Kingdome amongst themselves and some Gentiles, partners in the conspiracie. They were all forreiners but Nizamaluca. This and the other names before mentioned, were Titles of Honour, given them with their offices by the king, corrupted by the vulgar in pronouncing. Idalcam is *Adel-ham ; Adel* in the Persian language, signifieth Justice ; *Ham* is the Tartarian appellation, signifying a Prince, or King (which name might well be the reliques of the Tartarian conquests in those parts), so *Adel-ham* is *king of justice. Neza* in the Persian (which *Scaliger* saith is of like extent in the East, as Latine in the West) is a Lance; *Maluco* signi-

fieth the Kingdome. *Neza* or *Nizamaluco*, the speare or lance of the kingdome. So, *Cotamaluco*, the Tower of the kingdome. *Imadmaluco* the Throne of the kingdome, &c. *Nizamaluco* is also called *Nizamoxa*, which *xa* or *scha* is a Persian title (signifying as *Monsieur* in France, *Don* in Spaine), and given by *Ismael* the Sophi and *Tamas* his sonne to all those kings that would communicate in their sect, which *Nizamoxa* only yielded to. Other of them made shew, but soone recanted. Thus farre *Garcias*.'

"Now here we have an intelligent, and certainly an honest traveller, rendering his narrative, as far as the identification of proper names is concerned, not only almost wholly unintelligible, but leading himself into the commission of serious etymological blunders. By *Nizamaluco* no doubt is meant *Nizam al-Mulk*. This to the present day is a popular error for *Nazim al-Mulk*, a title meaning administrator, or a country governor of a kingdom, and frequently applied to the emperor's *Naibs* or Viceroys. The other titles I assume to be, *Adil Khan*, *Imad al-Mulk*, *Kutb al-Mulk*, *Nizam-Shah*. To the last mentioned, *Verido*, no oriental word that I am acquainted with will approximate. I fully concur in all that is said regarding the advantages that would result from reducing the number of alphabets in which we now find the languages of the world written; and if efforts are confined to unlettered languages, or those which have little or no original literature, probably no harm would result from making the attempt. If, again, the numerous alphabets of cognate languages could be reverted to the existing form of their original type, or that form of the same family of languages which had received the highest development, while in one sense it would be a retrogression, in another it would be an *immense* stride in advance. But if we were seeking for it, we could not, perhaps, find a more forcible illustration of the mischievous effects which I fear, as those who think with me fear, would follow the general adoption of a principle which, I cannot but think, when it came to be practically applied, would prove wholly impracticable.

"But to return to our *Seraffins*. I can find no such word in any oriental history, nor any nearer approach to it than that which, I before mentioned I believe it to represent—*viz.*, the *ashrafi*, which I may mention is itself etymologically a word of some obscurity. Abu'l Fazl has given very detailed information about the mints and coins of

Akbar. I am inclined to doubt if it can be entirely relied on. He gives a very long list of gold and silver coins as current. On four of these (the chozal, weighing 3 tolahs and $5\frac{1}{2}$ ratis, Rs. 30; the *aftâbe*, 1 tolah 2 mashas $4\frac{3}{4}$ ratis, Rs. 12; the *Illahi*, 12 mashas $1\frac{1}{3}$ ratis, Rs. 10; and the *Adl Gutkah*, 11 mashas, Rs. 9,)—Mr. Thomas has based some calculations. The rupee, Abu'l Fazl states, was first introduced by Shir Shah, and maintained in his currency by Akbar, who it is stated raised the standard, a statement which experiment will bear out. The currency of the Mohammadan Sovereigns of India, as a matter of antiquarian research, is of considerable interest to those who are studying this subject; but at the present time, when the question of a gold currency for India is being discussed, there is a point connected with it which, if this Society could throw any light on, would be of some practical importance. I allude to the value of silver expressed in gold, 250 years ago. Mr. Thomas, assuming the accuracy of Abu'l Fazl's statements, and on the basis of some calculations made by Colonel W. Anderson, has stated the relative values of gold and silver in Akbar's time to have been as 1 to 9·4. But I am unable to verify the data to be found in Abu'l Fazl, and here Purchas' statement, that an ashrafi, or *Seraffin* as he called it, was worth only Rs. 10, is of some value. I find no gold coin of Akbar's existing that will fit most of the coins described by Abu'l Fazl. Marsden figures 7 of Akbar's gold coins, five averaging $166\frac{1}{2}$ grains, and two 188 grains. Prinsep gives three, one weighing 159, another 174, and the third 186 grains. Dr. Shekleton, the assay master of the Calcutta Mint, who takes much interest in enquiries of the kind, and who is at present engaged in the preparation of some tables in continuation and amplification of Prinsep's, which will be of much value, has very kindly given me the weight of some thirty Shir Shahi and Akbari rupees from the rapidly formed but large collection of Colonel Guthrie, who has promised a further supply of gold coins for the same purpose. In forwarding the *data*, Dr. Shekleton says:—'I agree with you that Abu'l Fazl's coins and their par of exchange are hardly reliable: 9-4 to 1 is a relative value of gold to silver which never could really have existed;' and he adds:—'None of the silver coins are pure *absolutely;* they are about 16 Br., or 98.333 per cent. of pure metal. This, however, is termed pure by the native refiners, as their process does not admit of

a higher quality of refinage. 'Pure,' therefore, with reference to native coins, means that they contain no purposely added alloy.

'The average weight of all the Akbars is grs. 168.432.

'The value of 10 in Indian Rupees (present currency) is Rupees 10-0-7 at 16 Br.

'The average weight of the Shir Shah Rupees is grs. 167-13-3.

'Value of 10, in Indian Rupees, is Rupees 9-15-7, at 16 Br., showing that 10 Rupees of either Akbar or Shir Shah's coinage are about equal in value to 10 Rupees, present currency.'

"From the earliest times the current coins of all Mohammedan sovereigns have been the *dinár*, or gold denarius; the *dirhem*, or silver drachma; and the copper *fals*, or, as it is more generally used in the plural, *falus*. The word *dinár*, is a word of considerable historical importance, as it has given rise to certain chronological speculations by no means of small interest. It is used in an inscription of Chandra Gupta's date, as if the coin were then current; but it occurs very much earlier in Hindoo shasters prior to the time of Panini, who it is supposed lived in the fourth century B. C. It is mentioned, however, in early Sanskrit literature as an ornament only, and would appear to have been worn round the neck, several being strung together, separated by coral or other beads, in a manner similar to the necklaces of gold mohurs we see every day worn by the natives around us. The ancient Sanskrit Grammarians endeavoured to derive the word from Sanskrit roots; but there is no doubt that it is the Roman *denarius*, although that coin was of silver. The *dirhem* is the Greek *drachma*. Our cabinets of Bactrian coins furnish us with numerous specimens of drachmas, didrachmas, and tetradrachmas.

"The *falus* is the obolus. Akbar adopted the rupee of Shir Shah, and, if we are to put faith in Abu'l Fazl, paid great attention to the standard of his coins. Still, all the silver coins of his mints I have had tested differ somewhat in weight, some as much as 10 grains. The average of eleven, however, gives a coin as nearly as possible equal in weight to the Company's Rupee. The basis of his currency was the *dam*. Abu'l Fazl says that one of Akbar's rupees exchanged for forty of these dams, and this statement has helped Mr. Thomas; but I think some further investigation with the help of the coins themselves is desirable, before we accept so very low a value for gold in the reign of Akbar."

Mr. Blanford asked Captain Lees if he could inform the meeting of the origin of the application of the term *sovereign* to the coin.

Captain Lees replied that he had no doubt that the origin of the application of *sovereign* in England to gold coins of the realm was similar to that of the *Napoleon* and *louis d'or* to gold coins in France, and *Frederic d'or* to gold coins in Prussia. As to the word itself, its English orthography is so barbarous as to conceal its origin. The correct word is *suveran*, French *souverain*, for the Latin *supernus*, or, more nearly, the Italian *sovrano;* and it is a very singular coincidence, (but I may add that I attach to it only the singularity of a coincidence,) that in ancient Hindu literature gold and gold coin is most usually mentioned under this very term *suverna*; or if we drop the inherent final vowel, as is usual in the vernaculars, we shall have precisely the word the origin of which we are in search of, *suvern.*

Library.

The following additions have been made to the Library since the meeting held in July last.

Presentations.

*** *The names of donors in capitals.*

Verhandlungen des Zoologisch-botanischen Vereins in Wien, Jahr 1855—62, Vols. V. to XII.—The Zoologico-Botanic Society of Vienna.

Bericht über die Oesterreichische Literatur der Zoologie, Botanik und Palaeontologie, aus den Jahren 1850, 1851, 1852, 1853.—The Same.

Personen- Orts- und Sach Register der Wiener K. K. Zoologisch-botanischen Gesellschaft, 1851—55 and 1856—1860.—The Same.

Nachträge zu Maly's Enumeratio plantarum phanerogamicarum Imperii Austriaci Universi, von A. Neilreich.—The Same.

Separat-abdruck naturwissenschaftlicher Abhandlungen aus den Schriften des Zoologisch-botanischen Vereins in Wien.—The Same.

Festkranz zur zweiten Jahresfeier des Zoologisch-botanischen Vereins.—The Same.

Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Methematisch—Naturwissenschaftliche Classe, Band XLVI. abth. I.

Nos. 6 to 10; Band XLVII, abth. I, Nos. 1 to 3; Band XLVI, abth. II, Nos. 8 to 10—Band XLVII, abth. II, Nos. 1 to 4;—Philosophisch-Historische classe—Band XL, Heft 3, 4 and 5; Band XLI, Heft 1 und 2.—The Imperial Academy.

Register zu den Bänden 31 bis 40 der Sitzungsberichte der Philos-Historischen classe der K. Akademie der Wissenschaften, Vol. IV.—The Same.

Archiv für Kunde Oesterreichischer Geschichts-Quellen; Band XXVIII, Zweite Hälfte, und Band XXIX. Erste und Zweite hälfte.—The Same.

Fontes Rerum Austriacarum, Oesterreichische Geschichts-Quellen, Band V, abth. I; Band XXII, abth. II.—The Same.

Denkschriften der K. Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche classe, Band. XXI.—The Same.

Physicalische Verhältnisse und Vertheilung der Organismen im Quarnerischen Golfe, von Dr. J. R. Lorenz.—The Same.

Mémoires de L'Académie Impériale des Sciences, Belles-Lettres et Arts, de Lyon—Classe des Lettres, Tomes IX. and X.—Classe des Sciences, Tomes X. XI. and XII.—The Academy.

Annales des Sciences Physiques et d'Industrie, de Lyon, Vols. II. to VI. 3rd Series.—The Same.

Abhandlungen der Akad. d. Wissenschaften zu Berlin, aus dem Jahre 1862.—The Prussian Academy..

Monatsberichte der K. Preuss. Akademie der Wissenschaften zu Berlin, aus dem Jahre 1863.—The Same.

Memorie della Reale Accademia delle Scienze di Torino, Serie Seconda, Tomo XX. 1863.—The Royal Academy of Science of Turin.

Proceedings of the Royal Society of Edinburgh, Session 1862-63, Vol. 5 No. 59.—The Society.

Abhandlungen der Mathemat.-Physikalischen classe der königlich Bayerischen Akademie der Wissenschaften. Neunten Bandes, dritte abtheilung.—The Royal Bavarian Academy.

Sitzungsberichte der Königl. bayer. Akademie der Wissenschaften zu München; 1862, Band II, Heft 2—4; 1863, Band I, Heft 1 and 2.—The Same.

Denkrede auf Joh. Andreas Wagner, von Dr. Carl Friedrich Philipp von Martius.—The Same.

Ueber die Deutschen Einheitsbestrebungen im 16 Jahrhundert, von dem Konigl. Universitäts-Professor Dr. Cornelius.—The Same.

Rede in der öffentlichen Sitzung der K. Akademie der Wissenschaften am 28 März 1863, von Justus Freiherrn von Liebig.—The Same.

Ueber die Stellung und Bedeutung der pathologischen Anatomie, von Dr. L. Buhl, München, 1863.—The Same.

Zapiski Imperatorskago Russkago Geographikeskago Obstestva, 1862, knizka, I., II., and IV. and 1863, knizka I. and II.—The Imperial Academy of St. Petersburgh.

Otketŏ Imperatorskoi Publiknoi Biblioteki za 1860 Godô to 1862 Godô.—The Same.

Geographikesko—Statistikeskii Slovare Rossiiskoi Imperii, Tomŏ I. —The Same.

Catalogue des Manuscrits et Xylographes Orientaux de la Bibliothèque Impériale Publique de St. Petersbourg, 1852.—The Same.

Ein Beitrag zur Deutschen Literatur aus Russland, der Universität Jena; Lavater's Briefe an die Kaiserin Maria Feodorowna.—The Same.

Guide de la Bibliothèque Impériale Publique de St. Pétersbourg, 1860.—The Same.

Wegweiser der Kaiserlich Oeffentlichen Bibliothek zu St. Petersburg.—The Same.

Réglement pour les visiteurs de la Bibliothèque Impériale Publique de St. Pétersbourg, 1852.—The Same.

Les Elzevir de la Bibliothèque Impériale Publique de St. Petersbourg, 1862.—The Same.

Catalogue des publications de la Bibliothèque Impériale Publique de St. Petersbourg.—The Same.

Catalogus codicum Bibliothecae Imperialis Publicae Graecorum et Latinorum, Fasciculus Primus—Codices Graeci.—The Same.

Putevoditel po imperatorskoi publicnoi bibliotek.—The Same.

Chronologiceskaya Rospis Slavienskich Knig, by I. Karatayeb.—The Same.

Pravila dla posietitelei imperatorsckoi publicnoi biblioteki.—The Same.

Deciatilietie Imperatorskoi publicnoi bibiioteki, 1849-1859.—The Same.

Address of the President of the Linnean Society of London, delivered May 25th, 1863, and May 24th, 1864.—The Society.

List of the Linnean Society for 1863.—The Same.

The Annals of Indian Administration, Vol. VIII, Part 2.—The Bengal Government.

Journal of the Statistical Society of London, Vol. XXVII, Part 2, with a list of its Fellows in 1863.—The Society.

Journal of the Agri-Horticultural Society of India, Vol. XIII, Part 3.—The Society.

Journal Asiatique, Vol. III, Nos. 10 and 11.—The Asiatic Society of Paris.

Proceedings of the Royal Society of London; Vol. XIII, Nos. 64 to 67.—The Royal Society.

Rahasya Sandarbha; Vol. II, Nos. 14 and 15.—The Calcutta School Book Society.

Bijdragen tot de Taal-land-en Volkenkunde van Nederlandsch Indië; Vol. VII, Stuk 4 and 5; and Vol. VIII, Stuk I.—The University of Leyden.

Transactions of the Linnean Society of London, Vol. XXIV, Part 2. —The Society.

Journal of the Linnean Society of London—Zoology; Vol. VII, Nos. 27 and 28, and Vol. VIII, No. 29.—Botany; Vol. VII, Nos. 27 and 28, and Vol. VIII, No. 29.—The Society.

The Calcutta Christian Observer, Vol. XXV, Nos. 296 and 297.—The Editor.

Philosophical Transactions of the Royal Society of London, Vol. CLIII, Parts 1 and 2, with a list of its Fellows.—The Society.

Memoirs of the Geological Survey of India (Palæontologia Indica), Vol. III, Part 4.—The Bengal Government.

Proceedings of the Scientific Society of Ghazeepore, No. 5 of 1864. —The Society.

The Calcutta Review, No. 78.—The Editor.

The Oriental Baptist, Nos. 211 to 214 of Vol. XVIII.—The Editor.

Selections from the Records of the Madras Government, No. 77.—The Madras Government.

Returns showing the operation of the Income Tax Act in the N. W. Provinces for 1862-63.—The Government N. W. Provinces.

Calcutta Christian Intelligencer, Vol. XXXIX, Parts 7 to 10.—The Editor.

Journal of the Chemical Society of London, Vol. II, for April, May and June 1864.—The Society.

Journal of Sacred Literature and Biblical Record, Vol. V, No. 10.—The Editor.

Annales Musei Botanici Lugduno-Batavi, By F. A. Guil. Miguel, Tome I, Fasc. IV to VIII.—The Lugduno-Batavian Academy.

Proceedings of the Royal Geographical Society of London, Nos. 4 and 5 of Vol. VIII.—The Society.

The Anthropological Review and Journal, Vol. II, No. 5.—The Anthropological Society.

Professional papers on Indian Engineering, Vol. I, No. 4.— Major J. G. Medley.

Purána Sangraha, Part 14.— Babu Kali Prosonno Singh.

Selections from the Records of the Government of India, Public Works Department, Nos. 42 to 45.—The Government of India.

Memoirs of the Geological Survey of India, Vol. III, Part 2 and Vol. IV, Part 2.—The Bengal Government.

Quarterly Journal of the Geological Society of London, Vol. XX, No. 79.—The Society.

Statistics of the Trade of the port of Calcutta, Parts 3 and 4 with supplements to Parts 1 and 2, compiled by W. W. J. Wood, Esq.—The Compiler.

Annual Report of the Insane Asylums in Bengal for 1863, by J. McClelland, Esq.— The Bengal Government.

A Geographical, Statistical and General Report on the district of Hazareebaugh, by Capt. H. Thompson, Revenue Survey, from 1858-59, to 1862-63.—The Same.

Zeitschrift der Deutschen Morgenländischen Gesellschaft, Vol. XVIII, Part 3.—The Society.

Annual Report with Tabular Statements for the year 1863 on the condition and management of the Jails in the N. W. Provinces, by Dr. Walker.—The Government N. W. Provinces.

Proceedings of the Royal Irish Academy, Vol. VII, Parts 1 to 6.—The Academy.

Transactions of the Royal Irish Academy, Vol. XXIV, Part 1, Anti-

quities; Part 2, Polite Literature; and Part 3, Sciences.—The Same.

Report on the Survey operations of the Lower Provinces for 1862-63 The Bengal Government.

General Report on the Revenue Survey operations of the Bengal Presidency for 1861-62 and 1862-63.—The Government of India.

Ditto ditto, another copy.—The Surveyor General of India.

Report of the Commissioners appointed to enquire into the Sanitary state of the Army in India with precis of evidence, for 1863.—The Bengal Government.

Selections from the Records of the Government N. W. Provinces, Part XL.—The Government N. W. Provinces.

Madras Journal of Literature and Science, Third Series, No. 1.—The Madras Literary Society.

Memoirs of the Royal Astronomical Society of London, Vol. 31.—The Society.

Geological Magazine, No. 1 of 1864.—The Editor.

Journal of the American Oriental Society, Vol. VIII, No. I.—The Society.

The Agra Law Journal, embracing original dissertations on legal subjects, with select Civil, Criminal and miscellaneous decisions and circular orders Vol. I, No. 1.—The Compiler.

Report on the Police of the Town of Calcutta and its suburbs for 1863-64.—The Government of Bengal..

Nukata Mirza Bedil.—Jwala Nath Pundit.

Khumsat al Mujahis.—The Same.

Shahnameh in Urdu.—The Same.

Seh Nusura Zahuri and Diwan Shahi.—The Same.

Baharistan of Jami.—The Same.

Nufhatool Imun.—The Same.

Shír O'Shucker.—The Same.

Akhlak i Nasiri.—The Same.

Abu'l Fazl, Part 2nd.—The Same.

Abwabool Jinan.—The Same.

Siraj ul Loghat.—The Same.

Gulistan, with notes.—The Same.

Moonsha Talibeen.—The Same.

Marcaza adwar.—The Same.

Nuzarat ul Sindh.—THE SAME.

Byaz, Nos. 1 to 5.—THE SAME.

Arabic and Urdu Grammar.—THE SAME.

Akhlak i Jallali.—THE SAME.

Ayjaza Khusrowic.—THE SAME.

Timur Nameh.—THE SAME.

Preface to Anwar Suhili with notes; also an abridgement of the Grammar of the Urdu Language.—THE SAME.

Hakikath i Bekhud.—THE SAME.

Zubboor of David.—THE SAME.

Furhunga Farsee.—THE SAME.

Cards containing hymns of Gods and Goddesses in Small Devanágri characters embodied in the names of the Gods and Goddesses in large Devanagri characters.—THE SAME.

Sketches of the Colony of Sierra Leone and its inhabitants, by R. Clark.—THE AUTHOR.

The degree of uncertainty which local attraction, if not allowed for, occasions in the operations of Geodesy, by Archdeacon J. H. Pratt.—THE AUTHOR.

Lectures on the Science of Language, 2nd Series, by Professor Max Müller.—THE AUTHOR.

The Sunnyassee, letters and tales, by J. Hutchinson, Esq.—THE AUTHOR.

A Collection of Treaties, Engagements and Sunnuds, relating to India and the neighbouring countries, Vol. IV; compiled by C. U. Aitchison, Esq.—THE GOVERNMENT OF INDIA.

Arringhe officiose dell'avvocato Giambattista Dattino.—THE AUTHOR.

Abhandlung über die grosse Karthagische und andere neu-entdeckte Phönikische Inschriften, von H. Ewald.—THE AUTHOR.

The Gospel for the Afghans, by Capt. H. G. Raverty, 2 copies.—THE AUTHOR.

Exchanges.

The Athenæum for May, June, July and August, 1864.

The Philosophical Magazine and Journal of Science, Vol. XXVII, Nos. 184, 185; and Vol. XXVIII, Nos. 186 to 188.

Purchases.

The Annals and Magazine of Natural History, Nos. 78 to 81.

Comptes Rendus de l'Academie des Sciences, Nos. 18 to 26 of Vol. LVIII, and Nos. 1 to 7 of Vol. LIX.

The Edinburgh Review, Vol. CXX, No. 245.

Journal des Savants for May, June, July and August, 1864.

The Quarterly Review, Vol. CXVI, No. 231.

Revue des Deux Mondes for 15th May, June, July, August, and 1st September, 1864.

Revue et Magasin de Zoologie, Vol. XVI, Nos. 4 to 7.

The Westminster Review, New Series, Vol. XXVI, No. 51.

The Natural History Review, Vol. III, No. 15.

Numismatie Chronicle and Journal of the Numismatie Society, No. 14.

The Ibis, a magazine of general ornithology, Vol. VI, Nos. 21 and 22.

Journal of Entomology, descriptive and Geographical, Vol. I, Nos. 1 to 9.

Orient und Occident, Vol. II, Part IV, herausgegeben von Th. Benfey.

History of Modern Architecture, by J. Fergusson.

An Essay on the origin and formation of the Romance Languages, by Sir G. C. Lewis.

Buddhism in Thibet, with an Atlas of Plates, by E. Schlagintweit.

Dictionnaire Classique, Sanscrit-Francaise, Part 3.

Histoire Naturelle des Insectes. Genera des Coléoptères, par M. Th. Lacordaire, Vols. I. to VI. with plates.

Hewitson's Exotic Butterflies, Part 51.

Indische Spruche, Sanskrit und Deutsch, Vol. II, by Otto Bohtlingk.

Sanskrit Wörterbuch, by Otto Bohtlingk and R. Roth, Vol. IV. Nos. 26 and 27.

Atlas Ichthyologique des Indes Orientales Neerlandaises, by M. P. Bleeker, 14 Livraison.

Le Mahá-bhárata, poème épique de Krishna-Dwaipáyana, par Hippolyte Fauche, Vols. I and II.

Memoires d'Histoire et Geographie Orientales, by M. J. Goeje, No. 3.

Dictionnaire Turc-Arabe-Persan. Heft VII, by Dr. J. T. Zenker.

Ibn-el-Athiri, edited by C. J. Tornberg, Vol. X.

Portraits of the Game and Wild Animals of Southern Africa, by Captain W. C. Harris.

The Birds of India, by Dr. T. C. Jerdon, Vol. III., 2 copies.

Deutsches Wörterbuch, von Jacob Grimm, und Wilhelm Grimm, Vol. V. Part I.

LALGOPAL DUTT.

2nd November, 1864.

FOR DECEMBER, 1864.

The monthly General Meeting of the Asiatic Society of Bengal was held on the 7th instant.

Colonel R. Strachey, senior member present, in the chair.

The minutes of the last Meeting were read and confirmed.

Mr. Oldham desired to correct a misapprehension which had taken place in the report of what he had said at the Meeting in December last. He said that Dr. Gerard had sent a collection to Mr. Buckland and the Asiatic Society had sent one also, and that Dr. Gerard's was the first;—not that Dr. Gerard's collection reached home before the collection sent from Calcutta. Professor Phillips with characteristic caution had left the matter where he found it.

Mr. Blanford reminded the Meeting that, on the occasion referred to, he had reduced the argument of the validity of the Oxford fossils as affording evidence of the authenticity of the disputed specimens in the Society's Museum to one crucial question, viz., "Could it be proved by a comparison of dates, that Dr. Buckland's fossils reached England before the Society's collection reached Calcutta?" To this question he, and he believed others at the Meeting, had understood Mr. Oldham to reply that he had not his notes with him at the time, but he knew that he had notes of the dates required, and that they shewed that Dr. Gerard's fossils could not have been sent from the Society's Museum. Mr. Blanford still thought that it would aid the settlement of this question if Mr. Oldham would place his notes upon record in the Society's proceedings.

Mr. Oldham replied that he had some notes, but he declined to produce them.

Mr. Blanford remarked that in that case the whole matter remained

exactly where it was before Mr. Oldham made his attack upon his (Mr. Blanford's) paper on the Spiti Fossils.

Dr. Stoliczka mentioned that Mr. Schlagintweit has described from Gnari-Khorsum an Ammonite, viz., *Ammonites Kobelli*, which is very analogous to *A. bifrons*, so much so, that the one might be taken for the other; that both the species or varieties, as they may be called, exist in the Society's collection; and that it would be desirable to know whether the same are represented in the Oxford collections.

Mr. Blanford remarked that, though the species might be similar, the peculiarity of the supposed Gerard Fossils was in the absolute identity of their mineral character with that of the Whitby fossils; moreover, the abundance of the same species at Spiti and Whitby, and the absence at Spiti of other fossils having the same mineral character, but not specifically identical with Whitby fossils.

Colonel Strachey made some remarks tending to throw doubt on the authenticity of the disputed Gerard fossils.

The following presentations were announced :—

1. From W. Cornish, Esq. a specimen of the Black-backed Goose (*Sarkidiornis melanonotus.*)

2. From Lieutenant R. C. Beavan; two specimens of *Dendrocitta rufa.*

3. From Dr. F. Stoliczka; a specimen of *Lagomys Curzoniæ.*

4. From Baboo Rajendra Mullick; two specimens of *Goura Coronata*, or crowned Pigeon; five specimens of Wild Ducks, a Flamingo, and a black Lemur.

5. From A. C. L. Carlyle, Esq., Officiating Curator; three specimens of Bats: one *Nycticejus canus*, and two of a species of *Scotophilus*, Calcutta.

6. From Baboo Poorno Chunder Bysack, Assistant Curator; several specimens of young Rats.

7. From Lieutenant R. C. Beavan; three books, viz., "England's Workshops;" "The Utilization of Minute Life," and another work.

8. From the Government of India, Foreign Department; two copies of a series of Photographic likenesses of the tribes of Nepal, taken by Captain Taylor.

The Officiating Curator exhibited the skeletons of a large Crocodile and a Frog, *Rana Brahma*, prepared for the Museum.

A letter from Major A. B. Johnson, intimating his desire to withdraw from the Society, was recorded.

The Secretary read the following copy of a letter from the Secretary of State for India, sanctioning the transfer to Government of the Museum of the Asiatic Society of Bengal; forwarded by the Under-Secretary to the Government of India, Home Department:—

"India Office, London, 15th October 1864. Public.

No. 79.

"His Excellency the Right Hon'ble the Governor General of India in Council.

"Sir,—I have received and considered in Council your letter dated 27th June (No. 35) 1864; and I have in reply to communicate my sanction to the proposals therein submitted for the transfer to Government of the Museum of the Asiatic Society of Bengal, and for the formation of an Imperial Museum at Calcutta.

"2. I shall take immediate steps in accordance with your request for the selection of a competent Curator for the Museum, on the terms proposed by you, together with the allowance of one hundred and fifty pounds (£150) as passage and outfit money.

I have, &c.,

(Sd.) C. Wood."

No. 5870.

"Copy forwarded to the Secretary to the Asiatic Society, Calcutta, with reference to correspondence ending with his letter No. 177, dated 5th April 1864.

"By order,

(Sd.) "A. Colvin,

"*Officiating Under-Secy. to the Govt. of India.*"

The Council reported that, having received a letter from the officiating Curator requesting that his resignation, as announced to the last Meeting of the Society, might be withdrawn, they had allowed Mr. Carlyle to defer his resignation to the end of the current month (December), about or shortly after which time the Curator appointed by the Secretary of State may be expected to arrive.

The following gentlemen, duly proposed at the previous Meeting, were balloted for as Ordinary Members:—

W. Anderson, Esq.	Whitley Stokes, Esq.
H. Dunlop, Esq.	R. J. Richardson, Esq.
J. C. Sarkies, Esq.	E. S. Robertson, Esq.
D. R. Onslow, Esq.	E. T. Atkinson, Esq.
J. H. A. Branson, Esq.	

The following gentlemen were named for ballot as Ordinary Members at the ensuing Meeting.

Lieutenant J. H. Urquhart, R. E., proposed by Captain Godwin Austen, seconded by H. F. Blanford, Esq.

Dr. J. Anderson, proposed by Dr. Partridge, seconded by W. L. Heeley, Esq.

The receipt of the following Communications was announced:—

1. From Baboo Gopee Nauth Sen; an abstract of the Hourly Meteorological Observations taken at the Surveyor General's Office in September last.

2. From Dr. Stoliczka; a note on *Lagomys Curzoniæ* Hodgson.

The Secretary read Dr. Stoliczka's paper, of which the following is an abstract:—During a late visit to Eastern Ladak, Dr. Stoliczka had succeeded in procuring several specimens of this animal, one of which had been prepared for the Society's Museum, and was exhibited on the table of the meeting room. Although occurring plentifully in Ladak, this was the first specimen that had reached the Society's Museum. After a detailed description of specimens of different age, &c., and noting the differences which characterized young and adult specimens, Dr. Stoliczka gives an account of the habitat of the species. It does not live usually at a less elevation than 15,500 ft. above the sea. Round the Chomoriri lake it is associated with *Phaiomys lucurus* and *Arctomys bobac.* The greatest elevation at which Dr. Stoliczka met with it was 18,672 ft., at the top of the Ladak pass, on the confines of vegetation. Between 15,500 ft. and at the latter elevation, it is very abundant throughout Ladak, and it appears to range far to the Eastward, as Mr. Hodgson obtained specimens from Chumbi, N. W. of Sikhim. Dr. Stoliczka had not observed it south of the Bara Lacha range. In Spiti *L. Curzoniæ* is represented by another species, *L. Roylei*, which ranges between 12,500 and 16,000 ft.

On the motion of the Chairman, the thanks of the meeting were voted to Dr. Stoliczka.

The Secretary read the following report of the Meteorological Committee of the Society, prefaced by an Introductory Memorandum; also a letter from the Government of India, Military Department, and the resolution of the Council thereupon.

INTRODUCTORY MEMORANDUM.

The Meteorological Committee of the Society, as it at present exists, was formed on the proposition of Colonel Strachey in April 1857, apparently in the expectation that, as a deliberative body, it would superintend the Collection of Meteorological observations, acting, to quote the words of the original Memorandum, "as a controlling power capable of combining the work of all observers."

There are no records of any work having been done by the Committee up to February 1861, when the offer of some self-registering instruments to the Society gave rise to a discussion, which resulted in the resolution, "That it is not desirable for the Society itself to attempt to make Meteorological observations, but that the Council should be recommended to address Government generally, on the importance of establishing a uniform system of Meteorological Observation throughout India, so managed as to admit of proper comparison; and on the means which should be adopted to bring about improvements in existing registers; and generally to further the accurate investigation of Meteorological phenomena." At a subsequent meeting of the Committee in April 1862, Colonel Strachey submitted the draft of a Report in accordance with the above Resolution, and this with slight alterations was sent up to the Council, and laid before the Meeting of the Society in May 1862.

In this report, after pointing out the great importance of a knowledge of Meteorological laws, and the direct influence of Meteorological Phenomena on life, health, and property, and adducing the drought and consequent famine of the previous year, as a prominent instance in support of their view, it was shewn that the present system of Meteorological Observation and record is totally inadequate to afford the data requisite for the elucidation of the laws of the climate, or for enabling us to avail ourselves of them even were they known; that while many of the records, now kept, are made with no sufficient

attention, and are not susceptible of comparison one with the other, from the very different ways in which they are kept, the value of the whole is very much diminished if not altogether lost, owing to the impossibility of distinguishing the good from the bad. It was further observed that the very essence of the value of such observations is, that they should be brought in relation one with the other, and that this must be done in a regular, systematic, and scientific manner. It was therefore suggested that a Board of the leading scientific men in India should be appointed by Government to make suggestions on this and kindred subjects; and it was conceived that the suggestions of a Board so constituted would be received with thankfulness by Government and all individual observers, and that such recommendations would practically carry with them sufficient weight, to give that spirit and unity of method to all meteorological observation which is so entirely wanting at present, and which is so essential to any real progress in the science and its practical application. The Council, in presenting this report, requested the authority of the Society to address Government in accordance therewith; which authority, after an interesting and animated discussion, was formally accorded.

A letter, dated 20th June 1862, was therefore addressed to Government, recommending that a Meteorological Committee should be constituted by Government, on the plan of the Meteorological Committee of the Board of Trade in London, for the advancement of Meteorological Science. In this letter the special importance of Meteorological information in this country was strongly insisted on. "The terrific hurricanes that from time to time have swept over the Sea of Bengal, causing the most calamitous destruction of property in shipping, and carrying death almost to the entire population of whole districts that have been submerged by the storm-wave," were quoted as well-known facts; and it was predicted (a prediction the disastrous fulfilment of which is fresh in the recollection of us all), that such storms would surely be repeated in the future. The horrors of the famine of the previous year, and the importance of any knowledge that would enable us to foresee those terrible calamities, were appealed to as strong arguments for systematic reform of the existing inefficient machinery, and as an instance of the interest which the Government has in the effects of Meteorological phenomena. Other arrangements of a similar

character, and tending to the same end, were also adduced; and finally the Council stated that they would be prepared to submit a definite plan without loss of time, should the general views they had expressed be approved by His Excellency the Governor General in Council.

The reply of Government to this letter was received in February 1863. The Government intimated that it fully recognized the value of Meteorological observations properly conducted and collated by persons really competent to the task, and that it would afford all reasonable assistance, if a scheme can be devised likely to effect the object desired by the Asiatic Society. Further, the Government would be glad to receive and take into consideration the definite proposals of the Society, concluding that the nature of the observations, and the forms of recording them, will be proposed by the Society with a due regard to the circumstances under which, and the persons by whom, they may have in many cases to be conducted, and also to the great importance of ensuring as far as possible that they *may be relied on as accurate.*

This letter being referred to the Meteorological Committee, the preparation of a draft Report was entrusted to Colonel Strachey, on his intimation that he had a detailed scheme of operations which he wished to recommend to the Society.

Colonel Strachey's draft was received in April 1864, but in the interim, *viz.*, in November 1863, a *memo.* was received from the Military Department, intimating that the Government would be glad to be favoured with an early reply to the previous letter.

On the receipt of Colonel Strachey's draft it was at once circulated to the Committee, and a number of alterations were suggested, which, retaining the fundamental propositions of Colonel Strachey's draft, were embodied in a second draft, for circulation to the absent members of the Committee, and others, not members of the Committee, but whose suggestions might, it was thought, be useful to the end in view. It was desired to obtain the fullest expression of opinion on the part of those, who, from their scientific acquirements or their special interest in Meteorology, might be in a position to give important aid to the Committee; and the Draft, as agreed upon by the resident members of the Committee, was therefore printed with half margin, and circulated as already mentioned. To these circulars a

number of answers and comments were received, the majority being in full accordance with the terms of the report. These were circulated to the resident members of the Committee, and a meeting was then held, (on the 22nd August,) at which the whole Report was reconsidered, and some slight alterations agreed upon. The Report thus completed was sent up to the Council, and recorded at the meeting held on the 2nd September; but as it was thought desirable that a subject of so much importance should receive the leisurely consideration of the Council, it was ordered to be circulated to the Council, and to be reconsidered at the following meeting. The chief alteration suggested by the Council was, that that part of the Draft which provided for a Board of Meteorology should be struck out, on the ground that the essential requirements of the system were efficient administration, and that it would be undesirable to divide the responsibility between an executive Secretary and a deliberative Board. The report was therefore referred back to the Committee, recirculated and considered at two meetings, and in its final revised form is now submitted by the Council at this meeting of the Society.

At the time when these lengthened deliberations were approaching completion, *viz.*, on the 19th October, a letter was received from the Military Department, informing the Society, that " in consequence of a further communication from the Right Hon'ble the Secretary of State, transmitting some suggestions of the War Department, the Governor-General in Council has decided to entrust the consideration of the question to the Sanitary Commission, and does not therefore consider it necessary to trouble the Society any further in the matter. His Excellency desired, however, to convey the acknowledgments of Government to the Asiatic Society for their original offer, and for the trouble they are believed to have taken preparatory to carrying it out." On receipt of this letter, it was decided that the Report be completed as originally intended, and that its submission to the Society be deferred for a month, in order that, should any further information be received respecting this most unexpected communication, it might be submitted to the meeting, together with the Report and the Government letter.

No further communication has been received, and the Report is therefore now submitted to the Society, together with all correspondence relating thereto.

The following letter was then read:—

No. 280.

Military Department.

To the Secretary to the Asiatic Society.

Sir,—With reference to the office Memo. from this Dept. No. 226, dated 11th November 1863, requesting an early reply to a previous communication relative to the offer of the Asiatic Society to submit a scheme for systematically conducting and recording Meteorological Observations in India, I am directed to acquaint you that, in consequence of a further communication from the Right Hon'ble the Secretary of State, transmitting some suggestions of the War Department, the Right Hon'ble the Governor General in Council has decided to entrust the consideration of the question to the Sanitary Commission, and does not therefore consider it necessary to trouble the Society any further in the matter.

His Excellency in Council, however, desires me to convey the acknowledgments of Government to the Asiatic Society for their original offer, and for the trouble they are believed to have taken preparatory to carrying it out.

I am, &c.,

(Sd.) H. K. Burne, *Captain*,

Offg. Secy. to the Govt. of India.

Report of the Meteorological Committee.

In reporting upon the measures which, in the opinion of the Meteorological Committee, are essential to a sound and useful system of Meteorological registration, it must be premised that in Meteorology, as in all branches of physical science, accuracy of observation, and a clearly defined and rational aim, are indispensable to utility; and that, however desirable it may be that observations should be numerous, it is far better to limit them to any degree, than, by attempting to ensure fulness, to risk the accuracy and trust-worthiness of the record. Labour and money are equally thrown away upon any scheme which does not fulfil these all-important conditions.

That this proposition is true, when the object is purely to ascertain abstract laws, needs no argument; that it is equally true when the observations are made partly or chiefly with an economic or social object, is no less certain, though it may not at first sight be equally

apparent. The value of lunar tables to the seaman, that of a geological map to the miner, or of a chemical analysis to the manufacturer, depends upon their respective trustworthiness. If they cannot be trusted they are worthless; and the data, which it is the object of Meteorology to supply, in no way differ in this respect from those furnished by the Astronomer, the Geologist, or the Chemist. Among the more important indications of Meteorological data are the amount of rainfall, and the variation which this undergoes as cultivation increases or as forests are cleared; the causes of local and epidemic disease, which, although much wrapped in obscurity, may not improbably be in part dependent on the dampness of the atmosphere, the absence of ozone, the prevalence of particular winds, &c.; and the prognostication of storms, or of seasons of drought or unusual rainfall. Such phenomena are indeed only in a few cases capable of control, but it is only necessary to point to the results attained by Admiral Fitzroy, to prove that, when forewarned, we may be able in a great number of cases either to avoid or diminish their more disastrous effects. But in order that any of the laws of these phenomena may be determined, so that they may be acted upon with confidence, it is essential that the observations from which they are deduced be reliable and accurate. The observations of many successive years must, in most cases, be recorded, in order that the laws of recurring atmospheric changes, and the effects of those changes on agriculture, health, &c., may be ascertained, and the observations taken at different times and places must be capable of strict comparison. It is clear that no loose system of record will admit of this; and indeed the very knowledge that a series of observations had been made by an incompetent observer, or with instruments not strictly trustworthy, would at once be sufficient to warrant their rejection, when, as in Meteorology, the increments of variation are so small, that the error of observation will in many cases conceal or neutralize, if it does not absolutely invert, their true law of succession. Even if, at one and the same station, the conditions of error are so constant that a result true in the main is obtained, when the observation of different periods are compared, this will be the utmost attainable; and the observations are neither comparable with those taken under different conditions elsewhere, nor can they in any case be accepted with that confidence which alone will give them value,

when their indications are to be taken as the basis of active measures involving great interests. In truth, it may be stated as an invariable axiom, that scientific data which cannot be confidently accepted as trustworthy, are equally worthless to science and economics.

Strongly holding this view, the Meteorological Committee cannot recommend the adoption of any scheme which does not provide competent means of observation, and skilled and intelligent, in other words, special scientific supervision. They consider that in establishing a system of Meteorological registration for India, it may be wise not to aim at much detail, or at very extensive results at the outset, but it will be better to devote whatever sums the Government may grant for Meteorology, to provide a small but efficient staff, which may be extended in such manner and direction as experience may hereafter show to be advisable. It should be the duty of this staff, in the first place, to review the existing machinery of observation; to select and improve such parts as may be found capable of yielding useful results; and the rest should be strictly excluded from the Government official record as being only calculated to vitiate the general results if mixed up with more accurate data. When, by selection and careful supervision, a reliable system of record shall have been established, a Central Office will be necessary, at which the general results, furnished by the Local Officers of the staff, may be worked up into such a form as to render them available to Government and Foreign Meteorological bodies; and in the interim the whole system should be under the control of a skilled and trustworthy officer.

The general scheme which the Committee would therefore recommend, consists of the following parts:—

1*st.*—A Superintendent.

2*nd.*—Local Reporters, one to each of the seven Governments of India.

3*rd.*—Local observers, to be selected from those now existing, and others, who should be furnished with compared instruments and instructions to ensure uniformity of results.

The appointment, duties, and emoluments of each of these may be treated somewhat more in detail.

The Superintendent would be the sole responsible officer, to whose intelligence and scientific knowledge the formation and administration

of the entire system would be entrusted, and would be the immediate superior of the local Reporters. His duties would be to issue instructions as to the local Officers, to superintend the comparison and distribution of instruments, and their repair when necessary. He would carry on all correspondence with the Government and local Officers, and would receive all local reports, from which he would undertake the preparation of maps and such general reductions of the results of the department as would bring them into a form readily available to Government and the public, for general application. He would also place himself in communication with the Meteorological Departments of England and other countries, with a view to the exchange of Meteorological data, and in order that European Science might avail itself of the undoubtedly valuable additions which systematic observations in an inter-tropical country, possessing features so marked and varied as those of India, cannot fail to afford. These duties would demand much scientific knowledge and administrative capacity; and indeed the success of the system must, in a great measure, depend on the efficiency of this Officer. It would probably not be practicable to obtain a person qualified for the post at any salary below 1,000 Rupees per mensem, with travelling expenses and office allowance superadded. The appointment of some such officer is, it is considered, an essential part of any useful scheme of Meteorological registration, and the greatest care should be exercised in the selection of a person for the post.

The local Reporters, of whom one to each Government would probably prove sufficient at the outset, need not, it is considered, be Officers appointed exclusively to Meteorological work. It would be highly desirable that they should possess something beyond a mere empirical knowledge of Meteorology, and should be at least well acquainted with those portions of physics and physical geography which most closely relate to Meteorological phenomena; and to secure such qualifications, either a high salary must be offered, or a more moderate salary as an addition to that drawn for some other appointment. The latter course would probably be preferred; the more readily, as a larger field of selection would in this way be secured. It is considered desirable that persons habitually devoted to the pursuit of abstract knowledge, such as, for instance, some of the Professors of the Government or other Colleges, should, as a rule, be preferred for these appointments.

The local Reporters should be carefully selected, and such a salary should be offered as would make it worth their while to devote time and care to the duties. If a very small remuneration be offered, it is scarcely probable that time and attention of more than equivalent value will be given; for Meteorological work, involving much tedious detail, does not present the same attractions to speculative minds, as are possessed by sciences of more immediate generalization. It is considered that Rs. 400 per mensem for pay and travelling expenses, and Rs. 100 for office, would be a just and moderate remuneration for the local Reporters. An annual report on the reduced and generalized results should be a *sine qua non*.

The local Reporters would, in the first place, be entrusted with the collection of all observations actually made by different Officers of Government; and from the whole would select such as, with improved appliances and systematisation, may be brought to that standard of accuracy which has been pointed out as a primary condition of value.

They would then see that the selected observers be furnished with properly compared instruments, and with instructions to enable them to conform to the general system adopted; and they would occasionally visit the observing stations, to ensure that the instructions issued are strictly observed.

They would also receive the tabulated results, and either reduce them to the standards of comparison, or, if too numerous to deal with themselves, forward them to the Central Office for that purpose; in the former case, they would send to the Central Reporter, copies of the reduced observations, together with the annual report on the general results, for the area of observation.

The observations now recorded under orders of Government may be classed under four heads, *viz.* :—those made at—

1*st.*—The Government Observatories at the Presidency stations. These are generally trustworthy, and made with standard instruments. It is proposed that the Central Observatories be placed under the superintendence of the local Reporters, and that special attention be directed to them in order that the observations there made may be used as standards of comparison. In certain cases, also, extension may be advantageously given to the observations, so that at all central stations the following classes of phenomena be recorded, by self-registering instruments wherever possible :—

Temperature of air and solar rays.
Atmospheric moisture.
Rain-fall.
Strength and direction of wind.
Clouds.
Atmospheric pressure.
Electrical condition of lower atmosphere.
Ozone.
Magnetic dip, variation and intensity.

2nd.—The observations made at the Government Hospitals. These are, it is believed, rarely trustworthy, and it would probably be found desirable to restrict the records to the larger stations; and unless special observers are appointed, to limit the observations to those at the known hours of maximum and minimum, restricting the instruments to the thermometer (dry bulb), barometer and rain-gauge. By thus limiting the number and kinds of observations, it would probably be found practicable to give them a value, which for the most part they cannot be considered to have at present.

3rd.—The observations recorded at Civil Stations, Prisons, and Police Stations. The majority of these are believed to have but little value, and the observers are rarely of sufficient education or intelligence to be entrusted with a register, in which accuracy cannot be ensured without constant intelligent supervision. There may be particular cases in which an educated Officer might take such interest in the subject of Meteorology that he would volunteer the superintendence of the observations. In this case, the offer might be accepted at the discretion of the local Reporter, and the requisite instruments furnished by Government. All such observers should be volunteers; it being unquestionable, that it is impolitic and disadvantageous to impose the duties of registration on those who take no personal interest in the work. At the discretion of the local Reporters, and with the approval of the Superintendent, a certain small allowance for writers should be made to observers of this class. Elsewhere, but little would probably be lost by the abandonment of this class of registers; if retained, they should be made for local record only, and should not be allowed to appear side by side with those of more value, upon which, such an association would only tend to throw discredit.

4th.—On Government ships. These are fairly trustworthy, and, with a little care and attention on the part of the Reporter, may probably be made more so. The barometrical observations so made are especially of value, and those on the direction of the wind; every encouragement should be given to the multiplication of this class of observations on the larger merchant ships and private steamers.

A fifth class of observations may be recorded with advantage when obtainable, *viz.*, those made by educated Planters, Engineers, and others scattered through the country, not in Government service. Though these may be few in number, in certain cases they will be of a value fully equal to those made at the Central Observatories. The Society now receives a series of observations of this character from a gentleman in Ceylon, which, for accuracy, care and fulness, are surpassed by none in the country. Should any registers of this class be obtainable, it would clearly be advisable to afford the observers furnishing them every aid in the loan or repair of instruments, the supply of forms of registers, &c.

The scheme thus submitted would involve an immediate maximum annual cost of about Rs. 67,000, including cost of instruments, office, travelling expenses for the Superintendent, &c., which may be divided as follows:—

	Monthly.
Secretary and Superintendent,...............................	1,000
7 Local Reporters, at Rs. 500, ...	3,500
Central Office, Computers, &c., say	300
	4,800
Per annum	57,600
Instruments, Printing, &c., say	10,000
Total, per annum	67,600

The Committee believe that this scheme, without being very costly, would yield results which would amply compensate the expense. They would strongly urge as a general principle that any attempt to obtain Meteorological data on a cheap scale of payments will fail, as previous attempts have failed, and they believe that any expenditure

which is so incurred will prove a loss of money, entailing only disappointment on all who look to the registration of Indian Meteorology to give information of value in sanitation, agriculture, and the general administration of the country.

On the proposition of the Chairman, it was resolved that, seeing the small number of members present at the meeting, the discussion of the Meteorological report should be deferred till the next meeting.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	°	°	°	°
1	29.559	29.601	29.524	0.077	83.4	89.6	80.0	9.6
2	*Sunday.*							
3	.490	.546	.434	.112	81.5	84.7	78.4	6.3
4	.483	.521	.443	.078	81.8	83.8	80.0	3.8
5	.534	.574	.490	.084	82.4	86.8	78.8	8.0
6	.548	.589	.498	.091	82.7	85.4	79.8	5.6
7	.529	.564	.465	.099	84.3	90.2	80.0	10.2
8	.528	.578	.464	.114	85.4	90.3	82.2	8.1
9	*Sunday.*							
10	.487	.531	.402	.129	83.7	89 6	81.0	8 6
11	.458	.515	.388	.127	82.7	86.5	80.2	6.3
12	.442	.490	.392	.098	82.9	87.3	81.0	6.3
13	.482	.553	.436	.117	83.1	87.8	80.0	7.8
14	.523	.575	.459	.116	84.0	89.6	80.0	9 6
15	.498	.550	.417	.133	84.9	90.6	80.8	9.8
16	*Sunday.*							
17	.407	.467	.350	.117	81.4	85.2	79.8	5.4
18	.500	.591	.439	.152	80.5	84.4	78.2	6.2
19	.593	.647	.550	.097	82.1	87.4	79.6	7.8
20	.601	.648	.539	.109	84.5	88.8	81.6	7.2
21	.564	.603	.501	.102	84.1	86.8	81.9	4.9
22	.549	.596	.491	.105	81.5	85.8	78.2	7.6
23	*Sunday.*							
24	.631	.699	.563	.136	82.4	88.8	79.7	9.1
25	.665	.713	.618	.095	80.7	86.2	75.4	10.8
26	.678	.728	.641	.087	81.4	84.3	78.0	6.3
27	.704	.746	.659	.087	81 4	86.8	78.8	8.0
28	.678	.735	.598	.137	83.2	88.6	78 6	10.0
29	.649	.707	.587	.120	83.2	87.8	80.8	7.0
30	*Sunday.*							
31	.634	.687	577	.110	82.8	87.0	81.3	5.7

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	79.4	4.0	76.6	6.8	0.899	9.63	2.33	0.81
2	*Sunday.*							
3	78.7	2.8	76.7	4.8	.902	.70	1 61	.86
4	79.2	2.6	77.4	4.4	.922	.93	.47	.87
5	79.3	3.1	77.1	5.3	.913	.82	.79	.85
6	79.7	3.0	77.6	5.1	.928	.97	.75	.85
7	80.5	3.8	77.8	6.5	.934	.99	2.29	.81
8	80.7	4.7	77.4	8.0	.922	.85	.83	.78
9	*Sunday.*							
10	80.1	3.6	77.6	6.1	.928	.95	.12	.82
11	79.4	3.3	77.1	5.6	.913	.80	1.92	.84
12	79.5	3.4	77.1	5.8	.913	.80	.99	.83
13	80.0	3.1	77.8	5.3	.934	10.03	.83	.85
14	80.3	3.7	77.7	6 3	.931	9.98	2.19	.82
15	80.8	4.1	77.9	7.0	.937	10.02	.47	.80
16	*Sunday.*							
17	79.0	2.4	77.3	4.1	.919	9.90	1.37	.88
18	78.5	2.0	77.1	3.4	.913	.86	.12	.90
19	79.7	2.4	78.0	4.1	.940	10.11	.40	.88
20	80.9	3.6	78.4	6.1	.952	.19	2.16	.83
21	80.6	3.5	78.1	6.0	.943	.10	.11	.83
22	78.7	2.8	76.7	4.8	.902	9.70	1.61	.86
23	*Sunday.*							
24	79.4	3.0	77.3	5.1	.919	.88	.73	.85
25	78.0	2.7	76.1	4.6	.885	.53	.51	.86
26	78.7	2.7	76.8	4.6	.905	.73	.54	.86
27	79 0	2.4	77.3	4.1	.919	.90	.37	.88
28	80.3	2.9	78.3	4.9	.949	10.18	.71	.86
29	80.7	2.5	78.9	4.3	.967	.39	.50	.87
30	*Sunday.*							
31	80.3	2.5	78.5	4.3	.955	.27	.48	.87

All the Hygrometrical elements are computed by the Greenwich Constants.

From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-point.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month. Max.	Min.	Diff.	Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month. Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.565	29.715	29.415	0.300	81.3	83 6	79.2	4.4
1	.551	.712	.387	.325	81.0	82.8	78.4	4.4
2	.541	.706	.362	.344	80.9	83.0	78.6	4.4
3	.536	.688	.354	.334	80.7	83.2	78.4	4.8
4	.540	.679	.424	.255	80.7	82.8	78 0	4.8
5	.535	.688	.350	.338	80.5	82.3	75.4	6.9
6	.553	.698	.366	.332	80.6	82.2	76.0	6.2
7	.567	.723	.382	.341	80.9	82 6	76.0	6.6
8	.590	.729	.458	.271	82.2	84.4	76.7	7.7
9	.594	.741	.407	.334	83.2	86.2	77.2	9.0
10	.594	.746	.418	.328	84.2	87.2	78.4	8.8
11	.589	.743	.423	.320	85.0	88.8	79.4	9.4
Noon.	.578	.730	.424	.306	85.6	89.6	79.8	9.8
1	.560	.719	.432	.287	85.7	89.6	80.6	9.0
2	.537	.697	.401	.296	85.3	90.3	79.8	10.5
3	.518	.674	.396	.278	85.1	90.6	80.6	10.0
4	.504	.659	.378	.281	84.9	90.0	80.3	9.7
5	.511	.669	.392	.277	84.5	88.2	81.2	7.0
6	.518	.694	.390	.304	83.5	86.8	80 6	6.2
7	.535	.681	.418	.263	82.6	85.6	78.2	7.4
8	.555	.691	.439	.252	82.2	85.0	78.4	6.6
9	.571	.719	.454	.265	82.1	84.8	79.0	5.8
10	.583	.724	.464	.260	81.9	84.0	78.8	5 2
11	.581	.721	.454	.267	81.6	84.6	78.8	5.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Midnight.	79.1	2.2	77.6	3.7	0.928	9.99	1.25	0.89
1	78.9	2.1	77.4	3.6	.922	.93	.21	.89
2	78.8	2.1	77.3	3.6	.919	.90	.20	.89
3	78.7	2.0	77.3	3.4	.919	.92	.12	.90
4	78.8	1.9	77.5	3.2	.925	.98	.06	.90
5	78.5	2.0	77.1	3.4	.913	.86	.12	.90
6	78.6	2.0	77.2	3.4	.916	.89	.12	.90
7	78.9	2.0	77.5	3.4	.925	.98	.12	.90
8	79.3	2.9	77.3	4.9	.919	.88	.66	.86
9	79.7	3.5	77.2	6.0	.916	.83	2.06	.83
10	80.3	3.9	77.6	6.6	.928	.93	.31	.81
11	80.6	4.4	77.5	7.5	.925	.88	.65	.79
Noon.	80.6	5.0	77.1	8.5	.913	.74	3.02	.76
1	80.9	4.8	77.5	8.2	.925	.88	2.92	.77
2	80.6	4.7	77.3	8.0	.919	.82	.82	.78
3	80.7	4.4	77 6	7.5	.928	.91	.66	.79
4	80.7	4.2	77.8	7.1	.934	.99	.50	.80
5	80.5	4.0	77.7	6.8	.931	.96	.39	.81
6	80.3	3.2	78.1	5.4	.943	10.12	1.88	.84
7	79.9	2.7	78 0	4.6	.940	.09	.59	.86
8	79.7	2.5	77.9	4.3	.937	.08	.46	.87
9	79.6	2.5	77.8	4 3	.934	.05	.46	.87
10	79.4	2.5	77.6	4.3	.928	9.99	.45	.87
11	79.2	2.4	77.5	4.1	.925	.96	.38	.88

All the Hygrometrical elements are computed by the Greenwich Constants.

From the 1st January, 1863, the Greenwich New Factors have been used for Computing Dew-point.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	°	Inches.		lb	
1	131.0	0.14	S. W. & S. E.	..	Cloudy; also drizzling from 4 to 8 P. M.; and also at 11 P. M.
2	...	...	*Sunday.*	..	
3	...	1.90	W. & S. W.	½	Cloudy; also incessantly raining from 1 A. M. to Noon.
4	...	...	S. & S. W.	½	Cloudy also slightly drizzling between 8 & 10 A. M. and at 3 & 4 P. M.
5	...	0.76	S. & E.	½	Cloudy till 7 P. M. cloudless afterwards; also raining from 1 to 3 A. M. and between 10 and 11 A. M.
6	...	0.08	S. & S. E.	¾	Cloudless till 5 A. M.; cloudy till 6 P. M. cloudless afterwards; also drizzling occasionally from 6 A. M. to 1 P. M.
7	126 0	...	S. E. & S.	1	Cloudless till 4 A. M. cloudy afterwards; also slightly drizzling at 8 A. M. Noon, and 9 P. M.
8	123.2	...	S. & S. E.	1	Cloudy till 10 A. M. Scatd. ∩i till 7 P. M.; cloudless afterwards.
9	...	0.86	*Sunday.*	1	
10	119.0	...	S. E.	3	Cloudy; also very slightly drizzling after intervals.
11	...	0.17	E. & S. E.	2¼	Cloudless till 6 A. M. cloudy afterwards; and thundering at 2 P. M.; also drizzling at Noon & between 1 & 2 P. M.
12	...	0.50	E. & N. E.	5¼	Cloudy; and thundering at 1 P. M.; also raining between 10 & 11 A. M.; & at 1 & 5 P. M.
13	115.0	0.50	E.	2	Cloudless till 5 A. M.; cloudy till 4 P. M. cloudless afterwards; & thundering at Noon, also raining between 10 & 11 A. M. and at 3 & 4 P. M.
14	122.4	...	E. & S. E.	1¾	Cloudless till 6 A. M. Scatd. ⌣i till 11 A. M. Scatd. clouds till 8 P. M. cloudless afterwards; also thundering at Noon.
15	124.0	0.09	E.	4	Cloudless till 5 A. M. Scatd. ∩i till 7 P. M. cloudless afterwards; also drizzling between 3 & 4 A. M. & 11 & Noon & 5 & 6 P. M.
16	...	...	*Sunday.*	2½	
17	...	1.43	S.	3¼	Cloudy; also raining after intervals.
18	...	1.93	S. & S. E.	2	Cloudy till 8 P. M.; cloudless afterwards; also incessantly raining from 1 A. M. to Noon.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches			
19	...	0.30	S. & S. E.	$2\frac{3}{4}$	Cloudless till 3 A. M. cloudy till 7 P. M.; cloudless afterwards, also raining at 4, 5, 7, 9, & 11 A. M.
20	122.0	...	S. & S. E.	$4\frac{1}{4}$	Cloudless till 5 A. M. Scatd. ⌞i & ⌒i till 1 P. M. cloudy afterwards; with thunder at 6 P. M. also slightly drizzling at 7 P. M.
21	...	...	S. & W.	1	Cloudy; with thunder & lightning at Midnight; also drizzling at 1 A. M. and from 9 P. M. to 11 P. M.
22	...	3.50	W. & S.	$3\frac{1}{4}$	Cloudy; also constantly drizzling and raining.
23	...	...	*Sunday.*	$1\frac{1}{4}$	
24	...	0.24	S. E. & Calm.	$3\frac{1}{2}$	Cloudy; also raining from 2 P. M. to 4 P. M.
25	...	0.41	S. E. & S.	$2\frac{1}{4}$	Cloudy; also raining from 5 to 10 A. M.
26	...	0.12	S. & S. E.	$1\frac{1}{4}$	Cloudy, also drizzling between 5 & 6 A. M. at 9 & 10 A. M. & between 2 & 3 P. M.
27	...	0.19	S.	4	Scatd. ⌞i till 8 A. M. cloudy till 7 P. M. Scatd. ⌞i afterwards; also drizzling from 11 A. M. to 3 P. M.
28	128.0	...	S. & S. E.	$2\frac{1}{4}$	Scatd. clouds.
29	...	0.74	S. & S. E. & S. W.	$1\frac{3}{4}$	Scatd. ⌞i till 7 A. M. cloudy till 7 P. M. cloudless afterwards; also raining between 10 & 11 A. M. at 1, 3 & 4 P. M.
30	...	...	*Sunday.*	$1\frac{1}{2}$	
31	...	0.24	S. & E.	$1\frac{1}{2}$	Cloudy, also drizzling at 7 A. M. and from 1 to 3 P. M.

'\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌒⌞i Cumulo strati, \⌞i Nimbi, —i Strati, \⌒i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.555
Max. height of the Barometer occurred at 10 A. M. on the 27th, ..	29.746
Min. height of the Barometer occurred at 5 A. M. on the 17th, ..	29.350
Extreme range of the Barometer during the month, ...	0.396
Mean of the daily Max. Pressures, ...	29.606
Ditto ditto Min. ditto, ...	29.497
Mean daily range of the Barometer during the month, ...	0.109

	o
Mean Dry Bulb Thermometer for the month, ...	82.8
Max. Temperature occurred at 3 P. M. on the 15th, ...	90.6
Min. Temperature occurred at 5 A. M. on the 25th, ...	75.4
Extreme range of the Temperature during the month, ...	15.2
Mean of the daily Max. Temperature, ...	87.3
Ditto ditto Min. ditto, ...	79.8
Mean daily range of the Temperature during the month, ..	7.5

	o
Mean Wet Bulb Thermometer for the month, ...	79.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,..	3.1
Computed Mean Dew-point for the month, ...	77.5
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	5.3
	Inches
Mean Elastic force of Vapour for the month,..	0.925

	Troy grains
Mean Weight of Vapour for the month, ...	9.94
Additional Weight of Vapour required for complete saturation, ..	1.81
Mean degree of humidity for the month, complete saturation being unity,	0.85

	Inches
Rained 24 days, Max. fall of rain during 24 hours, ...	3.50
Total amount of rain during the month, ...	14.10
Prevailing direction of the Wind, ...	S. & S. E. & E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1863.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.					5		7		10				1	1					3
1					5		8		9	3	2	1	1	1			1		
2					6	1	8	1	8	1	2	1	1	1			1		
3					5	1	8		8	1	2	1	1	1			1		1
4					4	1	7	1	7	1	2	1	1	1			1		4
5	1				5		4	1	8	2	3	1	1	1			1		3
6	1				5		5		10	3	3	1	2	2					
7			3	1	5		4	1	9	3	3	1	2	1					
8	1				6		1	1	9	1	3		5	2					1
9					8	1	2	1	8	3	2	1	6	2					
10			1		7	1	1	1	9	2	3	1	5	1					
11			2		6	3	1		7	1	4	2	6	2					
Noon.			3		3	2	4	1	7	3	4	1	3	1	2				
1	1	1			6	1	5	1	5	2	4		4		1				
2			1	1	4	1	9	2	6	2	4	1	2						
3			2	1	5	1	3	1	9	3	4		3	2					
4			1	1	3	1	8	1	9	2	3	2	2						
5			1	1	2		6		12		2		1						2
6			1		1		7	2	13	2	1		3						
7	1		1		3		6	1	11	1	2		2	1					
8			1		4		6	1	11		1		1	1			2		
9			1		4		6		10	2	1		1	1			2		1
10			1		3		7		10	2	1		1				2		1
11			1		3		7	1	11	1	1		1	1			2		

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29 606	29.662	29.530	0 132	83.3	87.5	80.2	7.3
2	.625	.682	.572	.110	82.9	86.0	80 6	5.4
3	.677	.736	.624	.112	83.8	89.0	78.8	10.2
4	.669	.750	.583	.167	84.7	90 6	80.8	9.8
5	.618	.690	.593	.097	82.2	88.6	78.4	10.2
6	*Sunday.*							
7	.691	.754	.619	.135	83 5	89.6	79.8	9.8
8	.704	.769	.632	.137	84.3	90.3	80.2	10.1
9	.677	.746	.598	.148	83.5	88.5	80 6	7.9
10	.638	.702	.564	.138	82.9	86.6	80.2	6 4
11	.652	.713	.587	.126	82.3	87.5	80.0	7.5
12	.693	.758	.618	.110	80.9	85.2	79.0	6.2
13	*Sunday*							
14	.616	.701	.536	.165	81.7	85.1	77.8	7.3
15	.546	.596	.482	.114	83.7	88.4	80.2	8.2
16	.544	.590	.482	.108	83.5	87.8	80.6	7.2
17	.597	.653	.552	.101	83 0	86.8	80.4	6.4
18	.671	.729	.611	.118	83.1	87.2	80.6	6.6
19	.707	.778	.655	.123	83.3	88.7	80.0	8.7
20	*Sunday.*							
21	.640	.694	.557	.137	81.9	89.3	78.7	10.6
22	.619	.674	.554	.120	80.8	86.6	78.4	8.2
23	.626	.669	.558	.111	80.3	82.2	78.3	3.9
24	.616	.666	.550	.116	80.0	82.7	78.8	3.9
25	.607	.670	.550	.120	80.1	82 6	79.0	3.6
26	.659	.732	.599	.133	83.3	88.5	79.5	9.0
27	*Sunday.*							
28	.686	.750	.618	.132	84.4	89.0	80.2	8.8
29	.657	.718	.592	.126	84 6	88.8	81.6	7 2
30	.648	.698	.599	.099	82.7	85.3	78.0	7.3

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	80.1	3.2	77.9	5.4	0 937	10.06	1.87	0.84
2	79.8	3.1	77 6	5 3	.928	9.97	.82	.85
3	79.8	4.0	77 0	6.8	.910	.75	2.35	.81
4	80 2	4.5	77.0	7.7	.910	.73	.69	.78
5	78.9	3.3	76.6	5.6	.899	.65	1.89	.84
6	*Sunday.*							
7	79.8	3.7	77.2	6.3	.916	.83	2.17	.82
8	80 3	4.0	77.5	6.8	.925	.90	.38	.81
9	79.9	3.6	77.4	6.1	.922	.89	.11	.82
10	79.6	3 3	77.3	5.6	.919	.86	1.93	.84
11	79.4	2.9	77.4	4.9	.922	.91	.67	.86
12	78.9	2.0	77.5	3.4	.925	.98	.12	.90
13	*Sunday.*							
14	79.6	2.1	78.1	3 6	.913	10.14	.23	.89
15	80 5	3 2	78 3	5.4	.919	.18	.89	.84
16	80.6	2.9	78.6	4 9	.958	.28	.72	.86
17	80.1	2.9	78.1	4·9	.943	.12	.70	.86
18	80 0	3.1	77.8	5 3	.934	.03	.83	.85
19	80.1	3.2	77.9	5 4	.937	.06	.87	.84
20	*Sunday.*							
21	78.9	3.0	76.8	5.1	.905	9.73	.71	.85
22	78.3	2.5	76.5	4.3	.896	.67	.40	.87
23	77.6	2.7	75.7	4.6	.873	.41	.50	.86
24	77.9	2.1	76.4	3.6	.893	.64	.17	.89
25	78.3	1.8	77.0	3.1	.910	.83	.01	.91
26	79.6	3.7	77.0	6.3	.910	.77	2.16	.82
27	*Sunday.*							
28	80 6	3.8	77.9	6.5	.937	10.02	.29	.81
29	81.1	3.5	78.6	6.0	.958	.26	.13	.83
30	80.3	2.4	78.6	4.1	.958	.30	1.42	.88

All the Hygrometrical elements are computed by the Greenwich Constants. From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Hourly Means, &c of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month. Max.	Min	Diff.	Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month. Max.	Min.	Diff.
	Inches.	Inches	Inches.	Inches.	o	o	o	o
Mid-night.	29.654	29.721	29 558	0.163	81 2	83.0	79 0	4.0
1	.644	.714	.552	.162	81.0	82 8	78 8	4.0
2	.633	.711	.539	.172	80.7	82 6	78 8	3.8
3	.621	.702	.531	.171	80 6	82.4	78.2	4.2
4	.620	.687	.522	.165	80.3	81.8	77.8	4.0
5	.629	.701	.520	.181	80.2	82.8	78.4	4.4
6	.644	.722	.530	.192	80.2	82.8	78.3	4 5
7	.660	.743	.539	.204	80.9	83.4	79 4	4.0
8	.683	.758	.573	.185	82.9	84.5	79.9	4.6
9	.695	.778	.590	.188	83.8	85.8	80.6	5.2
10	.698	.772	.583	.189	85.0	87.6	80.4	7.2
11	.685	.754	.576	.178	86.0	88.4	80.8	7.6
Noon.	.667	.735	.561	.174	86.2	89.3	80.7	8.6
1	.638	.720	.528	.192	85.4	89 6	79 1	10.5
2	.614	.688	.506	.182	85.1	90.6	78.7	11.9
3	.594	.683	.482	.201	84.9	90.3	78.4	11.9
4	.582	.676	.482	194	84.8	89.5	79.6	9.9
5	.590	.663	.488	.175	83.6	87.4	79.9	7 5
6	.602	.669	.482	.187	82.9	86.2	79 4	6.8
7	.623	.689	.534	.155	82.4	85.4	79 6	5.8
8	.647	.708	.552	.156	82.0	84.8	79.2	5.6
9	.664	.729	.565	.164	81.8	84 2	79.4	4.8
10	.670	.729	.570	.159	81.4	83.8	78 6	5.2
11	.664	.727	.562	.165	81 2	83.6	78.0	5.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of Septe .ber, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	79.1	2.1	77.6	3.6	0.928	9.99	1.22	0.89
1	79.0	2.0	77.6	3.4	.928	10.01	.13	.90
2	78.8	1.9	77.5	3.2	.925	9.98	.06	.90
3	78.7	1.9	77.4	3.2	.922	.95	.06	.90
4	78.6	1.7	77.4	2.9	.922	.95	0.96	.91
5	78·6	1.6	77.5	2 7	.925	.98	.90	.92
6	78.6	1.6	77 5	2.7	.925	.98	.90	.92
7	79.1	1.8	77.8	3.1	.934	10.07	1.03	.91
8	79.9	3.0	77.8	5.1	.934	.03	.76	.85
9	80.3	3 5	77.8	6.0	.934	.01	2.09	.83
10	80.6	4.4	77.5	7.5	.925	9.88	.65	.79
11	80.7	5.3	77.0	9.0	.910	.71	3.20	.75
Noon.	80.7	5.5	76.8	9.4	.905	.65	.34	.74
1	80 4	5.0	76.9	8.5	.908	.68	.00	.76
2	80.2	4.9	76.8	8.3	.905	.67	2.90	.77
3	80.3	4.6	77.1	7.8	.913	.76	.73	.78
4	80.3	4.5	77.1	7.7	.913	.76	.70	.78
5	79.9	3.7	77 3	6.3	.919	.86	.17	.82
6	79.8	3.1	77.6	5.3	.928	.97	1.82	.85
7	79.7	2.7	77.8	4.6	.934	10.03	.58	.86
8	79.5	2.5	77.7	4 3	.931	.02	.45	.87
9	79.4	2.4	77.7	4.1	.931	.02	.38	.88
10	79 1	2 3	77.5	3.9	.925	9.96	.31	.88
11	79.1	2.1	77.6	3 6	.928	.99	.22	.89

All the Hygrometrical elements are computed by the Greenwich Constants.
From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches		lb	
1	...	...	S.	$1\frac{1}{3}$	Scatd. \—i till 4 A. M.; cloudy till 6 P. M.; cloudless afterwards.
2	...	0.19	S. & S. E.	4	Cloudy till 5 A. M.; Scatd. \—i till 10 A. M.; cloudy till 4 P. M. Scatd. \—i afterwards; also raining betweeu Noon & 1 P. M.
3	127.8	0.10	S. & S. E. & S. W.	$2\frac{1}{4}$	Scatd. \—i & ⌒i till 2 P. M. cloudy afterwards; also raining between 4 & 5 A. M.
4	135.5	..	S. & S. E.	$1\frac{3}{4}$	Cloudy till 2 A. M. Scatd. \—i & ⌒i till 2 P. M.; Scatd. clouds afterwards.
5	120.0	0.30	S. E. & E. & S.	4	Scatd. clouds till 8 A. M.; cloudy till 3 P. M.; cloudless afterwards; also raining between 1 and 2 P. M. and at 3 P. M.
6	...	0.32	*Sunday.*	$1\frac{3}{4}$	
7	130.0	0.46	S. & S. E.	3	Cloudless till 7 A. M. Scatd. \—i & ⌒i till 2 P. M., ; cloudy afterwards; also occasionlly raining from 2 to 7 P. M.
8	135.5	...	E. & S. E. & S.	2	Cloudless till 5 A. M. Scatd. \—i and ⌒i till 6 P. M. cloudless afterwards.
9	129.5	0.54	S. & S. E. & E.	$2\frac{1}{2}$	Cloudless till 6 A. M. Scatd. \—i & ⌒i till 5 P. M. cloudless afterwards; also raining at 2 & 3 P. M.
10	...	...	E. & S.	$2\frac{3}{4}$	Cloudless till 5 A. M. cloudy till 6 P. M. cloudless afterwards; also very slightly drizzling between noon & 1 P. M.
11	...	...	S. E. & S.	2	Cloudless till 2 A. M. cloudy afterwards; also drizzling at 6 A. M.
12	...	0.21	S. E.	$4\frac{3}{4}$	Cloudy; also constantly drizzling.
13	...	0.57	*Sunday.*	$4\frac{3}{4}$	
14	...	0.28	S.	3	Cloudy till 4 P. M.; cloudless afterwards; also drizzling from midnight to 4 A. M.
15	...	...	S.	$2\frac{1}{2}$	Cloudy till 5 P. M. cloudless afterwards.
16	135.0	0.55	S. E. & S. W. & Calm	$1\frac{1}{4}$	Cloudy; also raining at 5 A. M. and between 9 & 10 A. M.; and thundering and lightning between 10 & 11 P. M.
17	...	0.42	S.	$1\frac{1}{2}$	Cloudy; also raining at 3 A. M. & from 4 P. M. to 6 P. M.
18	...	0.10	E. & S. E.	8	Cloudy till 6 P. M.; cloudless afterwards; also drizzling between 11 & noon, at 2 P. M. & between 3 & 4 P. M.

Abstract of the Results of the Hourly Meteorological Observation[s] taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches.		lb	
19	130.0	0.88	S. E. & N. W.	2½	Cloudless till 7 A. M.; Scatd. cloud[s] afterwards; also raining betwee[n] noon and 1 P. M.; at 5 P. M. an[d] between 8 and 9 P. M.
20	...	..	*Sunday.*	2¼	
21	134.9	1.10	S. E.	10	Cloudy; also raining from 1 to 3 P. M
22	...	0.74	S. & N. E.	4	Scatd. ⌞i till 7 A. M.; cloudy afterwards; also raining from 2 to 7 P. M
23	...	...	N. E. & E.	2¾	Cloudy; also drizzling at 3 A. M. an[d] at 2 & 3 P. M.
24	...	0.40	E. & N. E & S. E.	5	Cloudy; also drizzling constantly.
25	...	0.44	E. & S. E.	3¾	Cloudy; also drizzling nearly the whol[e] day.
26	130.2	...	S. E. & S.	3	Scatd. clouds till 7 A. M.; Scatd. ⌞i & ⌒i till 4 P. M. cloudless afterwards.
27	...	0.61	*Sunday.*	2	
28	133.5	...	E. & S. E.	2	Scatd. ⌒i & ⌞i.
29	127.2	...	E. & Variable.	2	Cloudy; also slightly drizzling at 8 P. M
30	...	2.12	N. W. & S. E.	3	Cloudy; also raining between 11 an[d] noon, and from 4 to 10 P. M.

\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌒_i Cumulo strati, ⌞⌒i Nimbi,—i Strati ⌞⌒ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.643
Max. height of the Barometer occurred at 9 A. M. on the 19th, ..	29.778
Min. height of the Barometer occurred at 3 & 4 P. M. on the 16th, ..	29.482
Extreme range of the Barometer during the month, ...	0.296
Mean of the Daily Max. Pressures, ...	29.703
Ditto ditto Min. ditto, ...	29.579
Mean daily range of the Barometer during the month, ...	0.124

	°
Mean Dry Bulb Thermometer for the month, ...	82.7
Max. Temperature occurred at 2 P. M. on the 4th, ...	90.6
Min. Temperature occurred at 4 A. M. on the 14th, ...	77.8
Extreme range of the Temperature during the month, ...	12.8
Mean of the daily Max. Temperature, ...	87.2
Ditto ditto Min. ditto, ...	79.6
Mean daily range of the Temperature during the month, ...	7.6
Mean Wet Bulb Thermometer for the month, ...	79.6
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	3.1
Computed Mean Dew-point for the month, ...	77.4
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	5.3

	Inches
Mean Elastic force of Vapour for the month, ...	0.922

	Troy grains
Mean Weight of Vapour for the month, ...	9.91
Additional Weight of Vapour required for complete saturation, ..	1.81
Mean degree of humidity for the month, complete saturation being unity,	0.85

	Inches
Rained 23 days, Max. fall of rain during 24 hours, ...	2.12
Total amount of rain during the month, ...	10.33
Prevailing direction of the Wind, ...	S. & S. E. & E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1863.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	1		3	1	5	1	6		10	1							1		
1	1		3		5	1	6		10	1							1		
2	1		3		4	1	8		10	1									
3			3	1	3	1	7		9	2									4
4			2		3		9		8	1									4
5			3		4		8	3	8				1						2
6			2		3		11	1	9				1						
7			2		4		9		9				1		1				
8			2		6	1	6		10		1				1				
9					10		4		10	1	1				1				
10					11	2	4		9	1			1		1				
11	1		1		9	1	6	1	6		2				1	1			
Noon.			3		4		10	1	4		4				1	1			
1	1		1		7	2	8	3	6		2	1			1				
2					9	4	8	4	5	1	2		1		1				
3			1	1	6	3	8	4	7	1	1		1		2				
4			2		4	1	9	3	7	1	2		1		1	1			
5	1	1	1		3	1	9		10	4	2								
6					4	1	10	1	9	2	2		1						
7			1		4	1	7	1	10	2	1				1		2		
8					5		8	1	10						1	1	2	1	
9	1		1		4	2	6		10						1	1	2		1
10	1		1		4	1	8	1	9		1				1		1		
11	1		1		4		9	1	8		1				1		1		

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.616	29.713	29.588	0.125	81.1	86.1	76.8	9.3
2	.668	.725	.602	.123	81.8	86.1	79.2	6.9
3	.678	.729	.617	.112	81.6	88.0	79.0	9.0
4	*Sunday.*							
5	.621	.673	.549	.124	80.0	82.4	78.6	3.8
6	.662	.730	.605	.125	79.9	84.5	78.0	6.5
7	.751	.807	.702	.105	81.5	86.0	77.4	8.6
8	.828	.895	.766	.129	82.2	88.0	77.4	10.6
9	.844	.923	.791	.132	82.5	88.5	78.2	10.3
10	.841	.917	.773	.144	83.1	88.2	77.8	10.4
11	*Sunday.*							
12	.841	.915	.803	.112	84.2	90.0	79.1	10.9
13	.858	.917	.797	.120	85.1	90.4	80.4	10.0
14	.842	.917	.783	.134	85.2	90.3	81.6	8.7
15	.849	.911	.791	.120	84.7	89.8	80.8	9.0
16	.874	.946	.822	.124	84.2	89.6	80.0	9.6
17	.834	.907	.774	.133	80.1	84.2	77.2	7.0
18	*Sunday.*							
19	.922	.981	.868	.113	81.1	86.8	76.2	10.6
20	.948	30.003	.904	.099	78 9	83.6	74.4	9 2
21	.949	.029	.892	.137	79.3	85.9	74.0	11.9
22	.908	29.976	.839	.137	79.4	86.6	73.2	13.4
23	.895	.981	.830	.151	79.3	86.6	72.2	14.4
24	.876	.945	.832	.113	79.8	86.9	72.4	14.5
25	*Sunday.*							
26	.797	.872	.723	.149	79.8	86.6	74.2	12.4
27	.739	.796	.667	.129	81.2	88.0	75.4	12.6
28	.767	.820	.722	.098	80.3	84.6	78.6	6.0
29	.813	.870	.749	.121	81.0	86.6	76.8	9.8
30	.860	.928	812	.116	79.9	84.7	76.0	8.7
31	.862	.931	.804	.127	77.9	83.4	73.2	10.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	78.1	3.0	76.0	5.1	0.882	9.50	1.67	0.85
2	79.3	2.5	77.5	4.3	.925	.96	.44	.87
3	78.9	2.7	77.0	4.6	.910	.79	.55	.86
4	*Sunday.*							
5	78.0	2.0	76.6	3.4	.899	.71	.10	.90
6	78.0	1.9	76.7	3.2	.902	.74	.04	.90
7	78.4	3.1	76.2	5.3	.887	.56	.75	.85
8	78.0	4.2	75.1	7.1	.857	.21	2.33	.80
9	78.0	4.5	74.8	7.7	.849	.11	.53	.78
10	78.1	5.0	74.6	8.5	.843	.03	.83	.76
11	*Sunday.*							
12	79.5	4.7	76.2	8.0	.887	.51	.73	.78
13	80.4	4.7	77.1	8.0	.913	.76	.81	.78
14	80.6	4.6	77.4	7.8	.922	.85	.76	.78
15	79.8	4.9	76.4	8.3	.893	.56	.86	.77
16	78.1	6.1	73.8	10.4	.822	8.80	3.44	.72
17	76.8	3.3	74.5	5.6	.840	9.07	1.77	.84
18	*Sunday.*							
19	75.1	6.0	70.9	10.2	.748	8.07	3.10	.72
20	73.1	5.8	69.0	9.9	.704	7.60	2.87	.73
21	73 0	6.3	68.6	10.7	.695	.50	3.09	.71
22	72.9	6.5	68.3	11.1	.688	.43	.19	.70
23	71.8	7.5	66.5	12.8	.648	.00	.59	.66
24	73.0	6.8	68.2	11.6	.686	.40	.35	.69
25	*Sunday.*							
26	74.4	5.4	70.6	9.2	.741	8.00	2.75	.74
27	76.2	5.0	72.7	8.5	.792	.52	.69	.76
28	77.4	2.9	75.4	4.9	.865	9.34	1.57	.86
29	76.1	4.9	72.7	8.3	.792	8.54	2.60	.77
30	73.7	6.2	69.4	10.5	.713	7.69	3.09	.71
31	69.6	8.3	63.8	14.1	.593	6.42	.74	.63

All the Hygrometrical elements are computed by the Greenwich Constants.

From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-point.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.819	29.949	29.638	0.311	78.9	82.6	75.0	7.6
1	.803	.942	.617	.325	78.5	82.4	74.2	8.2
2	.795	.928	.609	.319	78.2	82.8	74.4	8.4
3	.791	.926	.596	.330	78.0	82.4	74.4	8.0
4	.785	.934	.588	.346	77.2	82.2	72.6	9.6
5	.786	.920	.596	.324	77.9	82.0	72.2	9.8
6	.820	.965	.608	.357	77.2	81.6	72.4	9.2
7	.839	.982	.633	.349	78.0	82.6	72.4	10.2
8	.862	30.015	.661	.354	80.3	84.6	76.3	8.3
9	.875	.029	.660	.369	81.8	86.4	77.6	8.8
10	.875	.027	.673	.354	83.1	87.4	79.4	8.0
11	.858	29.998	.651	.347	84.3	88.4	79.0	9.4
Noon.	.834	.980	.627	.353	85.3	89.6	79.9	9.7
1	.805	.956	.606	.350	85.5	90.3	80.4	9.9
2	.781	.935	.575	.360	85.4	90.4	78.8	11.6
3	.765	.919	.553	.366	85.8	90.1	79.0	11.1
4	.766	.904	.549	.355	85.4	90.3	79.4	10.9
5	.768	.922	.563	.359	83.9	88.8	79.8	9.0
6	.779	.928	.586	.342	82.6	87.0	78.8	8.2
7	.797	.950	.610	.340	81.5	86.3	77.4	8.9
8	.815	.961	.635	.326	80.8	84.8	76.2	8.6
9	.830	.961	.645	.316	80.2	84.4	75.0	9.4
10	.836	.963	.651	.312	79.7	83.8	74.2	9.6
11	.826	.956	.646	.310	79.5	83.2	75.7	7.5

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	76.2	2.7	74.3	4.6	0.835	9.03	1.44	0.86
1	75.9	2.6	74.1	4.4	.830	.00	.35	.87
2	75.8	2.4	74.1	4.1	.830	.00	.25	.88
3	75.5	2.5	73.7	4.3	.846	8.89	.30	.87
4	74.6	2.6	72.8	4.4	.795	.64	.31	.87
5	75.6	2.3	74.0	3.9	.827	.97	.19	.88
6	74.9	2.3	73.3	3.9	.809	.77	.18	.87
7	75.4	2.6	73.6	4.4	.817	.86	.33	.87
8	76.2	4.1	73.3	7.0	.809	.72	2.19	.80
9	76.5	5.3	72.8	9.0	.795	.55	.85	.75
10	76.7	6.4	72.2	10.9	.781	.36	3.50	.71
11	77.0	7.3	71.9	12.4	.773	.28	4.00	.67
Noon.	77.3	8.0	71.7	13.6	.768	.19	.45	.65
1	77.3	8.2	71.6	13.9	.766	.16	.56	.64
2	77.4	8.0	71.8	13.6	.771	.21	.47	.65
3	77.6	8.2	71.9	13.9	.773	.24	.59	.64
4	77.5	7.9	72.0	13.4	.776	.28	.40	.65
5	77.2	6.7	72.5	11.4	.787	.44	3.69	.70
6	77.5	5.1	73.9	8.7	.824	.85	2.83	.76
7	77.2	4.3	74.2	7.3	.832	.96	.35	.79
8	76.9	3.9	74.2	6.6	.832	.96	.11	.81
9	76.8	3.4	74.4	5.8	.838	9.04	1.84	.83
10	76.4	3.3	74.1	5.6	.830	8.96	.76	.84
11	76.6	2.9	74.6	4.9	.843	9.11	.55	.86

All the Hygrometrical elements are computed by the Greenwich Constants.

From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-point.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	°	Inches.		lbs	
1	130.0	0.15	S. E. & E. & S.	3	Cloudy till 10 A. M. Scatd. ⌒i & ╰i till 6 P. M. cloudless afterwards; also drizzling incessantly from 1 to 10 A. M.
2	128.5	0.18	S. E. & E.	2½	Cloudless till 6 A. M. Scatd. ╰i till 11 A. M. cloudy till 6 P. M. Scatd. ╰i afterwards; also drizzling from Noon to 3 P. M.
3	132.0	0.58	N. & N. E. & S. E.	3	Scatd. ╰i till 7 A. M. Scatd. ⌒i till Noon. cloudy till 8 P. M. cloudless afterwards; also drizzling at 1, 3 & 5 P. M. & thundering at 1 & 2 P. M.
4	...	...	*Sunday.*	3	
5	...	0.52	E. & S. E.	2	Cloudy till 7 P. M. cloudless afterwards; also drizzling from 5 to 11 A. M. & at 5 P. M.
6	127.0	0.87	S. E. & E.	3	Cloudy; also raining at 8 & 9 A. M. & from 1 to 4 P. M.
7	...	0.10	S. & E. & S. E.	3½	Cloudy till 6 A. M. Scatd. ⌒i & ╰i till 6 P. M. cloudless afterwards; also raining at 2 & 3 A. M.
8	139.8	...	S.	2½	Cloudless till 4 A. M. Scatd. ╰i & ⌒i till 6 P. M. cloudless afterwards.
9	143.0	...	S. & S. W.	2¼	Cloudless till 8 A. M. Scatd. ⌒i till 6 P. M. cloudless afterwards.
10	144.0	...	S. W. & S.	2½	Cloudless till 7 A. M. Scatd. ⌒i till 4 P. M. cloudless afterwards.
11	...	...	*Sunday.*	2¼	
12	144.0	...	S. W. & variable.	2¼	Cloudless till 5 A. M. Scatd. \i & ╰i till 9 A. M. Scatd. ⌒i till 5 P. M. cloudless afterwards.
13	139.7	...	N. E. & W.	2¼	Cloudless till 8 A. M. Scatd. ╰i & ⌒i till 4 P. M. cloudless afterwards.
14	137.2	...	N. E. & S.	2	Cloudless till 4 A. M. Scatd. ╰i till 10 A. M. cloudy till 2 P. M. Scatd. ╰i & ⌒i till 6 P. M. cloudless afterwards.
15	143.0	...	W. & S.	2¼	Scatd. ╰i & ⌒i till 3 P. M. cloudless afterwards.
16	144.0	...	S. & N. E.	2¼	Cloudless.
17	...	...	S.	2	Cloudy till 6 P. M. cloudless afterwards; also drizzling from 8 to 11 A. M.
18	...	...	*Sunday.*	2¼	
19	140.5	...	N. E. & S. E.	2½	Cloudless till 10 A. M. Scatd. ╰i & ⌒i till 5 P. M. cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches			
20	124.0	...	N. & N. W.	$1\frac{3}{4}$	Cloudless till 10 A. M. Scatd. clouds till 3 P. M. cloudless afterwards.
21	139.0	...	N. & N. E.	$1\frac{1}{2}$	Scatd. \i & ⌞i till 9 A. M. Scatd. ⌞i & ⌒i till 8 P. M. cloudless afterwards.
22	143.0	...	N. & N. W.	$1\frac{1}{2}$	Cloudless.
23	142.0	...	N. W. & N. & N. E.	$1\frac{3}{4}$	Cloudless till 6 P. M. Scatd. \i & ⌞i afterwards.
24	144.0	...	N. & N. E.	$1\frac{3}{4}$	Cloudless till 1 P. M. Scatd. clouds till 5 P. M. cloudless afterwards.
25	...	...	*Sunday.*	$2\frac{1}{2}$	
26	139.7	...	N. & N. E. & calm.	$1\frac{3}{4}$	Cloudless till 8 A. M. Scatd. ⌒i till 5 P. M. cloudless afterwards.
27	136.0	...	N. & E. & N. E.	$1\frac{1}{2}$	Scatd. clouds till 3 P. M. cloudy afterwards; also slightly drizzling at 7 P. M.
28	129.0	1.08	W. & S.	$1\frac{1}{2}$	Scatd. clouds till 11 A. M. cloudy till 5 P. M. Scatd. ⌞i afterwards; also raining at 2 & 3 P. M.
29	135.4	...	N.	$2\frac{1}{4}$	Scatd. ⌞i till 3 A. M. Scatd. clouds till 1 P. M. Scatd. \i till 8 P. M. cloudless afterwards.
30	135.2	...	N. & N. W.	$2\frac{1}{2}$	Cloudless till 8 A. M Scatd. clouds till 7 P. M. cloudless afterwards.
31	139.1	...	N. W. & N.	$1\frac{1}{4}$	Scatd. ⌞i till 2 P. M. cloudless afterwards.

\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⁀i Cumulo strati, ⋎i Nimbi, —i Strati, ⋀i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.814
Max. height of the Barometer occurred at 9 A. M. on the 21st, ..	30.029
Min. height of the Barometer occurred at 4 P. M. on the 5th, ..	29.549
Extreme range of the Barometer during the month, ...	0.480
Mean of the daily Max. Pressures, ...	29.880
Ditto ditto Min. ditto, ...	29.756
Mean daily range of the Barometer during the month, ...	0.124

	o
Mean Dry Bulb Thermometer for the month, ...	81.3
Max. Temperature occurred at 2 P. M. on the 13th, ...	90.4
Min. Temperature occurred at 5 A. M. on the 23rd, ...	72.2
Extreme range of the Temperature during the month, ...	18.2
Mean of the daily Max. Temperature, ...	86.8
Ditto ditto Min. ditto, ...	77.0
Mean daily range of the Temperature during the month, ..	9.8

	o
Mean Wet Bulb Thermometer for the month, ...	76.5
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,..	4.8
Computed Mean Dew-point for the month, ...	73.1
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	8.2
	Inches
Mean Elastic force of Vapour for the month,..	0.803

	Troy grains
Mean Weight of Vapour for the month, ...	8.65
Additional Weight of Vapour required for complete saturation, ..	2.59
Mean degree of humidity for the month, complete saturation being unity,	0.77

	Inches
Rained 9 days, Max. fall of rain during 24 hours, ...	1.08
Total amount of rain during the month, ...	3.48
Prevailing direction of the Wind, ...	N. & S.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1863.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
	No. of days.																		
Midnight.	5		2		6		2		5		1				2		2		2
1	5		2		6	1	3		5		1				2		2		1
2	5		3		6	2	3		5		1		1		1		2		
3	5		3		4	2	2		4		1		2		1		2		3
4	6		2		3	1	3		3		1		2		2				5
5	6		2	1	2	1	3		6		1		2		1				4
6	8		2	1	2	1	4		6		1		2		2				
7	8		4		5	1	4		4		1		1						
8	6		5		4	2	5	1	4		1		1		1				
9	6		8		3	1	2		5	1	1				2	1			
10	6		6		4	1	4		5	1	2								
11	8		4		3	1	5		2		3	1	1		1				
Noon.	4		8				8				4	1	1		2				
1	5		8				6	1	3	1			3		2	1			
2	7		6		1		3		1		2		4	1	3				
3	6	1	5		1		4	1	2		2	1	3	1	4				
4	6		4		2		2		3		3	1	3		3				1
5	9	1	3		1	1	1		4		2		3		3				1
6	9		2		2		2		4		2		2		3		1		
7	8	1	2		2		2		5		1		2		4		1		
8	6		3		1		2		6		1		2		5		1		
9	6		2		3		1		6		1		2		5				1
10	4		2		4		1		6		1		2		5		1		1
11	5		2		4		1		6		1		2		4		1		1

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	*Sunday.*							
2	29.845	29.921	29.784	0.137	77.2	84.8	70.2	14.6
3	.866	.934	.804	.130	78.6	86.3	71.2	15.1
4	.851	.925	.786	.139	77.9	85.5	71.0	14.5
5	.822	.893	.770	.123	76.7	84.7	70.6	14.1
6	.824	.892	.778	.114	76.6	84.9	68.4	16.5
7	.847	.910	.802	.108	75.9	82.6	69.4	13.2
8	*Sunday.*							
9	.862	.923	.816	.107	76.6	85.1	68.8	16.3
10	.909	.969	.861	.108	77.9	85.0	69.8	15.2
11	.964	30.018	.912	.106	76.7	85.7	74.4	11.3
12	.978	.055	.920	.135	76.2	81.4	72.2	9.2
13	.968	.015	.921	.094	76.4	81.4	73.8	7.6
14	.966	.037	.916	.121	78.0	84.9	73.9	11.0
15	*Sunday.*							
16	.929	29.995	.870	.125	79.6	85.8	75.0	10.8
17	.930	30.008	.880	.128	77.8	83.8	73.4	10.4
18	.973	.046	.899	.147	74.3	81.8	67.8	14.0
19	30.019	.083	.961	.122	72.7	80.6	65.0	15.6
20	.024	.101	.970	.131	70.9	79.4	64.7	14.7
21	.000	.078	.935	.143	72.6	80.8	65.8	15.0
22	*Sunday.*							
23	.047	.122	.996	.126	73.3	81.6	66.7	14.9
24	.035	.113	.983	.130	73.1	81.6	66.0	15.6
25	.019	.095	.951	.144	72.7	81.5	65.4	16.1
26	29.989	.074	.920	.154	73.3	81.2	66.4	14.8
27	.974	.036	.930	.106	73.4	81.4	67.0	14.4
28	30.041	.109	.970	.139	71.2	80.0	64.8	15.2
29	*Sunday.*							
30	.040	.110	.985	.125	68.5	77.4	61.6	15.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	*Sunday.*							
2	70.6	6.6	66.0	11.2	0.638	6.92	3.03	0 70
3	71.2	7.4	66.0	12.6	.638	.90	.48	.67
4	70.8	7.1	65.8	12.1	.634	.87	.29	.68
5	69.5	7.2	64.5	12.2	.607	.60	.20	.67
6	68.5	8.1	62.8	13.8	.574	.23	.54	.64
7	68.9	7.0	64.0	11.9	.597	.49	.08	.68
8	*Sunday.*							
9	69.5	7.1	64.5	12.1	.607	.60	.17	.68
10	70.4	7.5	65.1	12.8	.619	.71	.45	.66
11	72.4	4.3	69.4	7.3	.713	7.75	2.05	.79
12	72.8	3.4	70.4	5.8	.736	8.00	1.66	.83
13	73.2	3.2	71.0	5.4	.751	.17	.55	.84
14	73.5	4.5	70.3	7.7	.734	7.95	2.24	.78
15	*Sunday.*							
16	74.9	4.7	71.6	8 0	.766	8.27	.42	.77
17	71.4	6.4	66 9	10.9	.657	7.12	3.01	.70
18	66.9	7.4	61.7	12 6	.554	6.03	.09	.66
19	64.7	8.0	58.3	14.4	.494	5.40	.28	.62
20	64 2	6.7	58.8	12.1	.503	.51	2.72	.67
21	66.0	6.6	60.7	11.9	.536	.86	.80	.68
22	*Sunday.*							
23	67.2	6.1	62.3	11.0	.565	6.17	.67	.70
24	66.4	6.7	61.0	12.1	.541	5.91	.88	.67
25	66.9	5.8	62.3	10.4	.565	6 18	.50	.71
26	67.4	5.9	62.7	10.6	.572	.25	.59	.71
27	68.1	5.3	63.9	9.5	.595	.50	.37	.73
28	63.7	7.5	57.7	13.5	.485	5.31	.99	.64
29	*Sunday.*							
30	61.9	6.6	56.6	11.9	.467	.15	.50	.67

All the Hygrometrical elements are computed by the Greenwich Constants.
From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.946	30.045	29.807	0 238	72.2	77.7	62 9	14.8
1	.937	.037	.800	.237	71.6	76.9	62.8	14.1
2	.931	.029	.791	.238	71.0	76.0	62.8	13.2
3	.913	.023	.790	.233	71.2	75.6	65.7	9.9
4	.921	.021	.794	.227	69.5	75.4	62.9	12.5
5	.910	.032	.815	.217	69.7	75.4	62.0	13.4
6	.957	.046	.827	.219	69.1	75.4	61.6	13.8
7	.977	.077	.839	.238	69.4	75.2	62 2	13.0
8	.997	.110	.860	.250	72.6	77.8	64.5	13.3
9	30.013	.116	.888	.228	75.0	80.0	66.6	13.4
10	.015	.122	.892	.230	77.1	81.8	70.2	11.6
11	29.995	.104	.855	.219	79.1	83.3	72.6	10.7
Noon.	.969	.070	.837	.233	80.8	85.7	75.2	10.5
1	.933	.042	.809	.233	81.9	85.2	76.4	8.8
2	.912	.021	.780	.241	82.2	85.8	76.6	9.2
3	.900	.014	.771	.243	82.1	86.3	75.9	10.4
4	.894	29.996	.770	.226	80.8	85.3	75.2	10.1
5	.908	30.020	.775	.245	78.6	84.0	73.8	10.2
6	.917	.028	.779	.249	76.9	81.8	71.6	10.2
7	.935	.050	.785	.265	75.8	81.2	70.2	11.0
8	.950	.068	.794	.274	74.7	80.6	68.0	12.6
9	.960	.079	.806	.273	73.9	79.8	66.8	13.0
10	.965	.087	.820	.267	73.3	78.8	66.0	12.8
11	.958	.082	.828	.254	72.7	78.2	65.5	12.7

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	68.1	4.1	64.8	7.4	0.613	6.73	1.82	0.79
1	67.8	3.8	64.8	6.8	.613	.73	.67	.80
2	67.4	3.6	64.5	6.5	.607	.67	.58	.81
3	67.6	3.6	64.7	6.5	.611	.70	.60	.81
4	66.0	3.5	63.2	6.3	.582	.41	.47	.81
5	66.3	3.4	63.6	6.1	.590	.49	.44	.82
6	65.9	3.2	63.3	5.8	.584	.43	.35	.83
7	66.1	3.3	63.5	5.9	.588	.47	.39	.82
8	67.7	4.9	63.8	8.8	.593	.49	2.17	.75
9	68.3	6.7	63.6	11.4	.590	.43	.88	.69
10	69.0	8.1	63.3	13.8	.584	.33	3.59	.64
11	69.7	9.4	63.1	16.0	.580	.26	4.27	.59
Noon.	70.3	10.5	62.9	17.9	.576	.20	.87	.56
1	70.7	11.2	62.9	19.0	.576	.19	5.25	.54
2	70.8	11.4	62.8	19.4	.574	.17	.37	.54
3	70.7	11.4	62.7	19.4	.572	.15	.36	.53
4	70.8	10.0	63.8	17.0	.593	.39	4.68	.58
5	70.8	7.8	65 3	13.3	.623	.75	3.63	.65
6	71.0	5.9	66.9	10.0	.657	7.13	2.73	.72
7	70.3	5.5	66.4	9.4	.646	.04	.50	.74
8	69.9	4.8	66.5	8.2	.648	.07	.16	.77
9	69.3	4.6	66.1	7.8	.640	6.99	.02	.78
10	68.8	4.5	65.2	8.1	.621	.80	.04	.77
11	68.5	4.2	65.1	7.6	.619	.78	1.90	.78

All the Hygrometrical elements are computed by the Greenwich Constants. From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches		lbs	
1	...	...	*Sunday.*	2½	
2	139.5	...	N. & W.	2¼	Cloudless.
3	142.2	...	N.	1½	Cloudless.
4	144.2	...	N.	2	Cloudless.
5	140.9	...	N.	2	Cloudless.
6	145.0	...	N.	1¼	Cloudless.
7	126.4	...	N.	1	Cloudless till 9 A. M.; Scatd. clouds afterwards.
8	...	...	*Sunday.*	1¼	
9	145.6	...	N.	1¾	Cloudless.
10	143.0	...	N.	1¾	Cloudless till 9 A. M. cloudy afterwards.
11	140.2	1.04	N. & S. E.	2¼	Cloudless till 5 A. M. cloudy afterwards; also raining at 2 & 3 P. M. & drizzling at 6 & 7 P. M.
12	...	...	S. E. & N. & N. E.	1¼	Cloudy; also very slightly drizzling at 9 A. M.
13	...	0.22	N. E. & E.	1	Cloudy; also drizzling occasionally.
14	136.0	...	E.	2½	Cloudy till Noon; Scatd. ⌞i till 7 P. M. cloudless afterwards.
15	...	...	*Sunday.*	1½	
16	141.8	...	S. W. & N.	1¼	Scatd. ⌞i till 11 A. M.; Scatd. ⌒i till 4 P. M. cloudless afterwards.
17	146.0	...	N. W. & W.	1¼	Cloudless.
18	141.6	...	N. & N. W. &. W.	1	Cloudless; also slightly foggy from 8 to 10 P. M.
19	137.7	...	Variable.	1¼	Cloudless.
20	134.4	...	W. & N. W. & N.	1	Cloudless.
21	142.0	...	W.	1	Cloudless till 2 P. M. Scatd. ⌞i till 7 P. M. cloudless afterwards.
22	...	...	*Sunday.*	1	
23	139.0	...	N. W. & N.	1	Cloudless till 11 A. M. Scatd. ⌒i till 3 P. M. cloudless afterwards.
24	141.5	...	N. & N. W.	1	Cloudless.
25	140.2	...	N. & N. E.	¾	Cloudless.
26	138.5	...	N. & N. W.	1	Cloudless.
27	139.8	...	N. & S.	1	Cloudless.
28	141.2	...	N. & N. E..	1	Scatd. ⌞i till 10 A. M. cloudless afterwards.
29	...	...	*Sunday.*	1½	
30	137.2	...	N. E. & N. W. & N.	1	Cloudless.

\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌢i Cumulo strati, ⌞⌞i Nimbi, —i Strati, \⌒ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.918
Max. height of the Barometer occurred at 10 A. M. on the 23rd, ..	30.122
Min. height of the Barometer occurred at 4 P. M. on the 5th, ..	29.770
Extreme range of the Barometer during the month, ...	0.352
Mean of the Daily Max. Pressures, ...	30.018
Ditto ditto Min. ditto, ...	29.893
Mean daily range of the Barometer during the month, ...	0.125

	o
Mean Dry Bulb Thermometer for the month, ...	75.2
Max. Temperature occurred at 3 P. M. on the 3rd, ...	86.3
Min. Temperature occurred at 6 A. M. on the 30th, ...	61.6
Extreme range of the Temperature during the month, ...	24.7
Mean of the daily Max. Temperature, ...	82.8
Ditto ditto Min. ditto, ...	68.9
Mean daily range of the Temperature during the month, ...	13.9
Mean Wet Bulb Thermometer for the month, ...	68.9
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.3
Computed Mean Dew-point for the month, ...	64.5
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	10.7

	Inches
Mean Elastic force of Vapour for the month, ...	0.607

	Troy grains
Mean Weight of Vapour for the month, ...	6.61
Additional Weight of Vapour required for complete saturation, ..	2.76
Mean degree of humidity for the month, complete saturation being unity,	0.71

	Inches
Rained 3 days, Max. fall of rain during 24 hours, ...	1.04
Total amount of rain during the month, ...	1.26
Prevailing direction of the Wind, ...	N.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1863.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	16		2		1								2		4				
1	15		2		1								2		5				
2	14		2	1	1								2		5				1
3	15		2	1	1								2		2				3
4	13		2		1								1		3				5
5	11		3		1		1				1		2		2				4
6	13		3		1		1				1		2		4				
7	13		4		1						1		1		5				
8	14		3		4						1		1		1				1
9	13		4	1	3	1					1		1		2				1
10	12		5		2		2						1		3				
11	12		4		2		2						2		3				
Noon.	10		7		2		1		2				1		2				
1	11		5		2		1		2		1		3						
2	11		4		2	1	1	1	2		1		3		1				
3	13		1		2		2	1	1		1		2		3				
4	9		3		1		3				2		3		3				1
5	12		2		2	1	1		1		3		2		2				
6	11	1	2		3				1		1		4		3				
7	11	1	1		3				1		1		3		5				
8	11		1		3				1		1		3		5				
9	11		1		3				1				3		5		1		
10	11		1		2		1		1				4		4		1		
11	11		1		2		1				1		3		4		1		1

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day. Max.	Min.	Diff.	Mean Dry Bulb Thermometer.	Range of the Temperature during the day. Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	30.024	30.092	29.966	0.126	67.5	75.3	61.4	13.9
2	.063	.136	30.011	.125	66.9	77.2	59.0	18.2
3	.050	.140	29.980	.160	66.0	76.0	59.0	17.0
4	.016	.092	.950	.142	66.2	76.7	57.6	19.1
5	.028	.118	.971	.147	67.1	76.9	59.0	17.9
6	*Sunday.*							
7	29.970	.045	.914	.131	67.3	76.6	59.6	17.0
8	.996	.052	.952	.100	67.9	77.4	59.2	18.2
9	30.035	.110	.968	.142	67.8	77.2	59.6	17.6
10	.024	.100	.955	.145	68.0	77.8	59.6	18.2
11	29.994	.051	.913	.108	69.6	79.7	61.8	17.9
12	30.035	.118	.976	.142	68.3	78.4	61.0	17.4
13	*Sunday.*							
14	.046	.117	.997	.120	65.4	75.4	57.2	18.2
15	.043	.115	.988	.127	65.2	75.8	57.4	18.4
16	.024	.092	.963	.129	64.7	75.5	56.4	19.1
17	.002	.065	.934	.131	65.5	75.6	56.6	19.0
18	.052	.124	.973	.151	66.5	76.2	57.8	18.4
19	.076	.153	30.015	.138	66.5	76.2	57.4	18.8
20	*Sunday.*							
21	.065	.140	29.998	.142	66.1	76.6	57.4	19.2
22	.021	.099	.953	.146	67.6	78.8	58.4	20.4
23	.034	.108	.976	.132	69.3	78.0	62.6	15.4
24	.062	.139	30.006	.133	66.8	75.2	59.4	15.8
25	.054	.141	29.987	.154	65.1	75.2	57.6	17.6
26	.044	.119	.996	.123	65.0	76.4	56.8	19.6
27	*Sunday.*							
28	.060	.136	30.016	.120	65.6	75.4	56.8	18.6
29	.028	.095	29 975	.120	66.6	76.5	59.4	17.1
30	.014	.082	.948	.134	67.1	77.0	61.0	16.0
31	29.997	.077	.928	.149	65.8	75.8	57.2	18.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	61.0	6.5	55.8	11.7	0.455	5.03	2.39	0 68
2	60.4	6.5	55.2	11·7	.445	4.93	.35	.68
3	59.5	6.5	54.3	11.7	.432	.79	.29	.68
4	59.6	6.6	54 3	11.9	.432	.79	.33	.67
5	61.1	6.0	56.3	10.8	.462	5.11	.21	.70
6	*Sunday.*							
7	61.3	6.0	56.5	10.8	.465	.14	.23	.70
8	62.0	5.9	57.3	10.6	.478	.27	.24	.70
9	62.2	5.6	57.7	10.1	.485	.35	.13	.72
10	62.1	5.9	57.4	10.6	.480	.29	.24	.70
11	63.2	6.4	58.1	11.5	.491	.40	.50	.68
12	61.6	6.7	56.2	12.1	.461	.08	.52	.67
13	*Sunday.*							
14	59.0	6.4	53.9	11.5	.426	4.73	.22	.68
15	59.3	5.9	54.6	10.6	.437	.85	.06	.70
16	59.0	5.7	54.4	10.3	.434	.82	1.98	.71
17	60.1	5.4	55.8	9.7	.455	5.05	.93	.72
18	60.9	5.6	56.4	10.1	.464	.14	2 05	.72
19	60.0	6.5	54.8	11.7	.440	4.86	.33	.68
20	*Sunday.*							
21	60.2	5.9	55.5	10.6	.450	.99	.11	.70
22	62.0	5.6	57.5	10.1	.481	5.32	.12	.72
23	63.5	5.8	58.9	10.4	.504	.56	.27	.71
24	60.5	6.3	55.5	11.3	.450	4.99	.27	.69
25	59.3	5.8	54.7	10.4	.438	.87	.02	.71
26	59.2	5.8	54.6	10.4	.437	.86	.01	.71
27	*Sunday.*							
28	59.5	6.1	54.6	11.0	.437	.85	.15	.69
29	61.1	5.5	56.7	9.9	.469	5.18	.03	.72
30	62.0	5.1	57.9	9.2	.488	.39	1.93	.74
31	59.3	6.5	54.1	11.7	.429	4.76	2.28	.68

All the Hygrometrical elements are computed by the Greenwich Constants. From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	30.035	30.097	29.948	0.149	62.4	65.8	59.4	6.4
1	.027	.096	.939	.157	61.8	65.2	58 8	6.4
2	.019	.081	.936	.145	61.1	64.8	58.4	6.4
3	.014	.073	.954	.119	60.4	64.0	57.8	6.2
4	.005	.067	.934	.133	59.9	63.4	57.6	5.8
5	.015	.055	.945	.110	59.5	62.7	56.8	5.9
6	.035	.092	.965	.127	59.0	62.7	56.4	6.3
7	.054	.100	.991	.109	58.9	62.8	56.4	6.4
8	.080	.125	30.014	.111	62.8	65.8	59.0	6.8
9	.099	.140	.045	.095	65.6	69.8	62.4	7.4
10	.105	.153	.045	.108	68.5	72.4	66.0	6.4
11	.088	.129	.030	.099	71.6	75.0	68.8	6.2
Noon.	.060	.108	29.999	.109	73.9	77.3	71.4	5.9
1	.022	.064	.968	.096	75.5	78.5	73.0	5.5
2	29.998	.040	.939	.101	76.5	79.7	74.0	5.7
3	.981	.030	.929	.101	76.3	78.6	74.8	3.8
4	.975	.030	.914	.116	74.8	77.2	73.2	4.0
5	.983	.044	.923	.121	72.3	75.0	69.6	5 4
6	.993	.058	.937	.121	69.8	72.2	68.2	4.0
7	30.011	.076	.960	.116	67.7	71.0	66.0	5.0
8	.027	.089	.975	.114	66.4	69.4	64.6	4.8
9	.039	.104	.979	.125	65.2	68 6	63.4	5.2
10	.046	.113	.986	.127	64.1	67.9	62.3	5.6
11	.040	.104	.983	.121	63.4	67.2	61.3	5.9

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	59.2	3.2	56.3	6.1	0.462	5.17	1.16	0.82
1	58.8	3.0	56.1	5.7	.459	.14	.07	.83
2	58.2	2.9	55.6	5.5	.452	.06	.02	.83
3	57.5	2.9	54.9	5.5	.441	4.94	.01	.83
4	57.1	2.8	54.6	5.3	.437	.91	0.94	.84
5	56.7	2.8	54.2	5.3	.431	.84	.94	.84
6	56.3	2.7	53.9	5.1	.426	.80	.89	.84
7	56.1	2.8	53.6	5.3	.422	.75	.92	.84
8	58.3	4.5	54.2	8.6	.431	.80	1.61	.75
9	59.8	5.8	55.2	10.4	.445	.95	2.05	.71
10	61.6	6.9	56.1	12.4	.459	5.08	.57	.66
11	63.0	8.6	56.1	15.5	.459	.03	3.37	.60
Noon.	63.5	10.4	56.2	17.7	.461	.02	.99	.56
1	63.9	11.6	55.8	19.7	.455	4.94	4.52	.52
2	64.2	12.3	55.6	20.9	.452	.90	.85	.50
3	64.0	12.3	55.4	20.9	.449	.87	.82	.50
4	63.5	11.3	55.6	19.2	.452	.93	.33	.53
5	63.8	8.5	57.0	15.3	.473	5.18	3.40	.60
6	63.4	6.4	58.3	11.5	.494	.43	2.52	.68
7	62.7	5.0	58.7	9.0	.501	.54	1.92	.74
8	61.9	4.5	58.3	8.1	.494	.47	.70	.76
9	61.1	4.1	57.8	7.4	.486	.40	.51	.78
10	60.5	3.6	57.3	6.8	.478	.31	.36	.80
11	60.0	3.4	56.9	6.5	.472	.25	.28	.80

All the Hygrometrical elements are computed by the Greenwich Constants. From the 1st January, 1863, the Greenwich New Factors have been used for computing Dew-points.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches		lbs	
1	122.0	...	N.	1	Scatd. clouds till 9 A. M., Scatd. \i & ⌞i till 6 P. M. cloudless afterwards.
2	136.0	...	N.	1½	Cloudless till 6 A. M. Scatd. \i till 3 P. M. Scatd. ⌞i till 6 P. M. cloudless afterwards.
3	139.0	...	N. & N. W.	¾	Cloudless till 8 A. M. Scatd. ⌞i till Noon; cloudless afterwards also foggy at 9 P. M.
4	136.2	...	N. & N. W.	¾	Cloudless.
5	135.0	...	N.	½	Cloudless.
6	...	...	*Sunday.*	1	
7	139.0	...	W. & N. W.	1	Cloudless.
8	137.5	...	N. W. & E.	½	Cloudless.
9	136.5	...	N. & N. W.	½	Cloudless.
10	138.0	...	N. W.	½	Cloudless.
11	137.0	...	S. W. & N.	¼	Cloudless till 6 A. M. Scatd. \i & ⌞i till 6 P. M. cloudless afterwards.
12	138.6	...	N. W. & W.	1½	Cloudless till 8 A. M. Scatd. \i & ⌞i till 6 P. M. cloudless afterwards.
13	...	...	*Sunday.*	1	
14	135.0	...	N.	½	Cloudless.
15	135.0	...	N. & N. W.	½	Cloudless.
16	135.5	...	N. & N. W.	¼	Cloudless.
17	135.0	...	N. & N. W.	½	Cloudless; also slightly foggy from 9 to 11 P. M.
18	137.2	...	N.	½	Cloudless.
19	135.8	...	N.	1¾	Cloudless; also slightly foggy at 9 & 10 P. M.
20	...	...	*Sunday.*	¾	
21	138.0	...	N.	¾	Cloudless; also foggy from 8 to 11 P. M.
22	139.7	...	S. & W.	¾	Cloudless.
23	134.0	...	N. & W. & S.	½	Cloudless.
24	135.0	...	N.	¾	Cloudless.
25	136.0	...	N.	¾	Cloudless.
26	139.0	...	N. & N. W.	¾	Cloudless.
27	...	...	*Sunday.*	½	

\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌒⌞i Cumulo strati, ⌒⌞i Nimbi, —i Strati, ∖⌒ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	o	Inches.		lb	
28	128.0	...	N. & W.	$\frac{1}{4}$	Scatd. \—i till 3 P. M. cloudy till 8 P. M. cloudless afterwards also foggy between 9 & 11 P. M.
29	124.8	...	W. & N. & S. W.	$\frac{1}{4}$	Scatd. \i & \—i till 4 P. M. cloudless afterwards.
30	134.0	...	N.	$\frac{1}{4}$	Cloudless.
31	137.0	...	N. & W. & N. E.	$\frac{1}{4}$	Cloudless; also slightly foggy at 11 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	30.032
Max. height of the Barometer occurred at 10 A. M. on the 19th, ..	30.153
Min. height of the Barometer occurred at 4 P. M. on the 7th, ..	29.914
Extreme range of the Barometer during the month, ...	0.239
Mean of the Daily Max. Pressures, ...	30.106
Ditto ditto Min. ditto, ...	29.972
Mean daily range of the Barometer during the month, ...	0.134

	°
Mean Dry Bulb Thermometer for the month, ...	66.7
Max. Temperature occurred at 2 P. M. on the 11th, ...	79.7
Min. Temperature occurred at 6 & 7 A. M. on the 16th, ...	56.4
Extreme range of the Temperature during the month, ...	23.3
Mean of the daily Max. Temperature, ...	76.6
Ditto ditto Min. ditto, ...	58.7
Mean daily range of the Temperature during the month, ...	17.9

	Inches
Mean Wet Bulb Thermometer for the month, ...	60.7
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.0
Computed Mean Dew-point for the month, ...	55.9
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	10.8
Mean Elastic force of Vapour for the month, ...	0.456

	Troy grains
Mean Weight of Vapour for the month, ...	5.05
Additional Weight of Vapour required for complete saturation, ..	2.18
Mean degree of humidity for the month, complete saturation being unity,	0.70

	Inches
Rained No. days, Max. fall of rain during 24 hours, ...	*Nil.*
Total amount of rain during the month, ...	*Nil.*
Prevailing direction of the Wind, ...	N.&NW

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1863.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	17		1								1		2		4				2
1	18		1						1		1		2		4				
2	18		1						1		1		2		4				
3	18		1						1		1		1		4				1
4	17								1		1		3		3				2
5	13		1						1		1		3		1				7
6	19								1		2		2		2				1
7	17		1		1				1		3		3		1				
8	20		3		1						2				1				
9	16		4		2						2		2		1				
10	14		4		3						2		3		1				
11	14		3		3		1				1		1		4				
Noon.	16		2				1		1		4		1		2				
1	14		2						1				4		6				
2	18		1						1		1		1		5				
3	15		1						1		1		1		8				
4	14		1								1		2		9				
5	13										1		4		9				
6	13												5		8				1
7	13										1		5		8				
8	13								1				5		8				
9	14								1				5		7				
10	13								1				5		7				1
11	13								1				4		7				2

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Feet.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.969	30.051	29.903	0 148	65.8	76.2	57.0	19.2
2	.965	.030	.912	.118	67.2	76.4	59.8	16.6
3	*Sunday.*							
4	30.033	.130	.969	.161	65.1	74.4	56.4	18.0
5	.001	.066	.948	.118	65.5	75.8	57.2	18.6
6	.021	.093	.967	.126	65.8	75.0	58.4	16.6
7	.068	.154	30.018	.136	64.2	73.6	56.4	17.2
8	.076	.157	.020	.137	63.2	73.0	55.0	18.0
9	.089	.177	.027	.150	64.3	75.0	55.6	19.4
10	*Sunday.*							
11	.033	.111	29.965	.146	65.6	77.4	57.4	20.0
12	.038	.123	.991	.132	66.9	77.0	58.6	18.4
13	.044	.129	.992	.137	65.5	76.4	56.0	20.4
14	29.995	.090	.923	.167	64.8	74.8	56.0	18 8
15	.954	.042	.876	.166	65.7	76.7	56.0	20.7
16	.884	29.933	.836	.097	65.3	71.9	58.0	13.9
17	*Sunday.*							
18	.943	30.025	.883	.142	64.5	73.2	56.4	16.8
19	.951	.040	.894	.146	65 1	74.7	56.6	18.1
20	.974	.051	.922	.129	64.8	75.9	55.0	20.9
21	30.002	.087	.945	.142	64.3	74.8	55.4	19.4
22	29.969	.059	.912	.147	65.8	77.3	54.8	22.5
23	.898	29.980	.828	.152	69.7	82.2	59.6	22.6
24	*Sunday.*							
25	.979	30.051	.930	.121	62.4	73.1	52.8	20.3
26	.990	.070	.935	.135	62.8	74.0	52.8	21.2
27	.967	.039	.924	.115	64.0	76.2	54.0	23.2
28	.960	.023	.917	.106	64.5	75.8	56.0	19.8
29	30.000	.080	959	.121	64.7	76.2	55.4	20.8
30	.000	.086	.933	.153	63.3	74.7	54.2	20.5
31	*Sunday.*							

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	60.0	5.8	55.4	10.4	0.449	4.98	2.06	0.71
2	61.7	5.5	57.3	9.9	.478	5.28	.07	.72
3	*Sunday.*							
4	58.1	7.0	52.5	12.6	.407	4.52	.37	.66
5	59.0	6.5	53.8	11.7	.425	.71	.27	.68
6	58.4	7.4	52.5	13.3	.407	.52	.52	.64
7	57.5	6.7	51.5	12.7	.393	.37	.32	.65
8	56.4	6.8	50.3	12.9	.377	.21	.28	.65
9	57.1	7.2	50.6	13.7	.381	.24	.48	.63
10	*Sunday.*							
11	59.2	6.4	54.1	11.5	.429	.76	.24	.68
12	59.8	7.1	54.1	12.8	.429	.75	.53	.65
13	59 0	6.5	53.8	11.7	.425	.71	.27	.68
14	58.8	6.0	54.0	10.8	.428	.75	.08	.70
15	59.7	6.0	54.9	10.8	.441	.89	.13	.70
16	60.5	4.8	56.7	8.6	.469	5.19	1.74	.75
17	*Sunday.*							
18	58.7	5.8	54.1	10.4	.429	4.78	.98	.71
19	58.2	6.9	52.7	12.4	.409	.56	2.33	.66
20	57.6	7.2	51.8	13.0	.397	.41	.42	.65
21	57.1	7.2	50.6	13.7	.381	.24	.48	.63
22	58.6	7.2	52.8	13.0	.411	.56	.48	.65
23	62.6	7.1	56.9	12.8	.472	5.18	.75	.65
24	*Sunday.*							
25	53.7	8.7	45.9	16.5	.324	3.62	.71	.57
26	54.1	8.7	46 3	16.5	.329	.67	.74	.57
27	55.7	8.3	48.2	15.8	.351	.91	.74	.59
28	56.8	7.7	50.6	13.9	.381	4.24	.52	.63
29	55.4	9.3	48.0	16.7	.349	3.87	.93	.57
30	55.3	8.0	48.1	15.2	.350	.90	.61	.60
31	*Sunday.*							

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	30.003	30.096	29.933	0.163	60.5	63.4	57.0	6.4
1	29.989	.090	.895	.195	59.9	62.8	56.2	6.6
2	.981	.090	.874	.216	59.3	62.6	55.2	7.4
3	.972	.081	.869	.212	58.6	62.4	54.8	7.6
4	.967	.073	.862	.211	57.9	62.3	54.2	8.1
5	.982	.080	.859	.221	57.0	61.0	53.4	7.6
6	.992	.090	.877	.213	56.9	60.2	53.2	7.0
7	30.013	.114	.900	.214	56.2	59.8	52.8	7.0
8	.041	.160	.908	.252	60.2	64.0	56.8	7.2
9	.063	.177	.909	.268	63.2	65.6	60.0	5.6
10	.071	.174	.933	.241	66.6	70.8	64.0	6.8
11	.053	.153	.912	.241	69.5	74.9	66.0	8.9
Noon.	.022	.117	.901	.216	72.2	78.0	69.4	8.6
1	29.989	.070	.869	.201	73.9	80.2	71.4	8.8
2	.963	.046	.846	.200	75.1	82.2	71.0	11.2
3	.944	.038	.836	.202	75.3	82.1	71.6	10.5
4	.937	.027	.828	.199	73.9	80.0	70.8	9.2
5	.941	.032	.836	.196	71.8	77.6	67.2	10.4
6	.949	.038	.837	.201	68.9	73.6	65.6	8.0
7	.968	.068	.848	.220	66.5	70.4	62.8	7.6
8	.985	.095	.865	.230	64.9	68.2	61.6	6.6
9	30.001	.110	.921	.189	63.5	66.6	60.0	6.6
10	.000	.118	.875	.243	62.7	67.6	58.8	8.8
11	29.995	.084	.871	.213	61.7	67.2	57.0	10.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Midnight.	56.3	4.2	52.5	8.0	0.407	4.57	1.40	0.77
1	56.1	3 8	52.7	7.2	.409	.60	.25	.79
2	55.6	3.7	52.3	7.0	.404	.55	.19	.79
3	55.2	3.4	52.1	6.5	.401	.52	.10	.80
4	54.7	3.2	51.8	6.1	.397	.48	.01	.82
5	54.0	3.0	51.3	5.7	.390	.41	0.93	.83
6	53.9	3.0	51.2	5.7	.389	.40	.92	.83
7	53.2	3.0	50.2	6.0	.376	.26	.95	.82
8	55.2	5.0	50.7	9.5	.382	.29	1.62	.73
9	56.7	6.5	50.8	12.4	.383	.28	2.21	.66
10	58.2	8.4	51.5	15.1	.393	.36	.85	.61
11	59.4	10.1	51.3	18.2	.390	.30	3.58	.55
Noon.	60.4	11.8	51.0	21.2	.386	.23	4.32	.50
1	60.9	13.0	51.8	22.1	.397	.33	.68	.48
2	61.6	13.5	52.1	23.0	.401	.37	.97	.47
3	61.6	13.7	52 0	23.3	.400	.35	5.05	.46
4	61.0	12.9	52.0	21.9	.400	.36	4.65	.48
5	61.3	10.5	52.9	18.9	.412	.52	3.93	.54
6	61.3	7.6	55.2	13.7	.445	.91	2.83	.63
7	60.5	6.0	55.7	10.8	.453	5.02	.17	.70
8	59.6	5.3	55.4	9.5	.449	4.98	1.87	.73
9	58 6	4.9	54.2	9.3	.431	.80	.75	.73
10	58.1	4.6	54.0	8.7	.428	.77	.62	.75
11	57.5	4.2	53.7	8.0	.423	.74	.45	.77

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. P. of W.	General Aspect of the Sky.
	°	Inches.		lbs	
1	132.4	...	N.	¼	Cloudless; also slightly foggy from 2 to 5 A. M.
2	129.7	...	N. & N. W.	¼	Scatd. clouds till 1 P. M.; cloudless afterwards.
3	...	...	*Sunday.*	¼	
4	146.8	...	N. & N. W.	½	Cloudless.
5	137.4	...	N. & N. W.	½	Cloudless till 5 A. M.; Scatd. \i till Noon; cloudless afterwards.
6	127.5	...	N. W. & N.	¾	Cloudless.
7	136.0	...	N. & N. W.	½	Cloudless.
8	131.8	...	N. W. & N.	¼	Cloudless.
9	133.2	...	N.	¾	Cloudless.
10	...	...	*Sunday.*	½	
11	130.0	...	N.	½	Cloudless.
12	133.8	...	N.	½	Cloudless; also foggy between 8 & 11 P. M.
13	136.0	...	N.	¼	Cloudless.
14	128.0	...	N.	¼	Cloudless till 1 P. M.; Scatd. clouds till 8 P. M.; cloudless afterwards also slightly foggy at 11 P. M.
15	131.2	...	S. E. & N.	¼	Cloudless.
16	124.0	...	N. & S.	¼	Cloudless till 1 P. M.; Scatd. clouds till 5 P. M.; cloudless afterwards.
17	...	...	*Sunday.*	½	
18	131.2	...	N. & W.	1¼	Cloudless till 1 P. M.; Scatd. ⌒i & ⌊i till 6 P. M.; cloudless afterwards, also slightly foggy from 9 to 11 P. M.
19	132.0	...	N. W. & W.	½	Cloudless.
20	137.5	...	W. & N. W.	¼	Cloudless; also foggy from 8 to 11 P. M.
21	134.6	...	N. W. & W.	½	Cloudless; also slightly foggy from 8 to 11 P. M.
22	136 0	...	N. W. & S. & S. W.	½	Cloudless.
23	142.8	...	S.	¾	Cloudless; also slightly foggy between 3 & 7 A. M.
24	...	...	*Sunday.*	¾	
25	136.0	...	W. & N.	¼	Cloudless; also foggy at 8 P. M.
26	132.0	...	W. & N. W. & N.	¼	Cloudless.
27	136.0	...	N. & S.	¼	Cloudless.
28	133.0	...	N. & W. & S.	1½	Cloudless, also foggy at 5 A. M. and between 9 & 11 P. M.
29	137.0	...	W. & N.	¼	Cloudless.
30	131.0	...	N. & W.	½	Cloudless.
31	...	...	*Sunday.*	¼	

\i Cirri, ⌊i Cirro strati, ⌒i Cumuli, ⁀i Cumulo strati, ⌊⌒i Nimbi, —i Strati, ⌒\i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.992
Max. height of the Barometer occurred at 9 A. M. on the 9th, ..	30.177
Min. height of the Barometer occurred at 4 P. M. on the 23rd, ..	29.828
Extreme range of the Barometer during the month, ...	0.349
Mean of the daily Max. Pressures, ...	30.072
Ditto ditto Min. ditto, ...	29.936
Mean daily range of the Barometer during the month, ...	0.136

	o
Mean Dry Bulb Thermometer for the month, ...	65.0
Max. Temperature occurred at 2 P. M. on the 23rd, ...	82.2
Min. Temperature occurred at 7 A. M. on the 25th & 26th, ..	52.8
Extreme range of the Temperature during the month, ...	29.4
Mean of the daily Max. Temperature, ...	75.5
Ditto ditto Min. ditto, ...	56.2
Mean daily range of the Temperature during the month, ..	19.3

	o
Mean Wet Bulb Thermometer for the month, ...	58.0
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,..	7.0
Computed Mean Dew-point for the month, ...	52.4
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	12.6
	Inches
Mean Elastic force of Vapour for the month,..	0.405

	Troy grains
Mean Weight of Vapour for the month, ...	4.50
Additional Weight of Vapour required for complete saturation, ..	2.37
Mean degree of humidity for the month, complete saturation being unity,	0.66

	Inches
Rained no days, Max. fall of rain during 24 hours, ...	Nil.
Total amount of rain during the month, ...	Nil.
Prevailing direction of the Wind, ...	N. & N. W. & W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of January, 1864.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	14								3				3		2				4
1	15						1		2				5		3				
2	14						1		2				5		4				
3	14						1		2				4		4				1
4	14						1		2				3		5				1
5	14								1				5		2				4
6	12								2		2		5		1				4
7	15								3		2		5		1				
8	15		1						2		3		3		1				1
9	14		3		1				3		1		2		2				
10	11		3		2				2		2		4		2				
11	11		2		2		1		2		1		5		2				
Noon.	10		1		2		1						8		4				
1	6		1		1				1		2		4		11				
2	7								1		2		8		8				
3	7						1		1		2		4		11				
4	10						1		1				4		10				
5	9						1		2				5		9				
6	11						1		3				4		7				
7	11						1		3				5		6				
8	11						1		3				5		6				
9	11						1		2				5		6				1
10	9						1		3				5		7				1
11	10						1		3				5		6				1

Abstract of the Results of the Hourly Meteorological Observatiosn taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	30.074	30.155	30.015	0.140	68.0	78.4	58.8	19.6
2	.111	.183	.060	.123	69.8	78.4	63 6	14.8
3	.120	.193	.055	.138	71.8	80.8	64 8	16.0
4	.132	.213	.072	.141	71.8	81 2	65.2	16.0
5	.136	.234	.057	.177	68.3	79.2	58.8	20.4
6	.108	.190	.027	.163	68.2	80.4	57.8	22.6
7	*Sunday.*							
8	.034	.121	29.967	.154	71.7	82.5	64.0	18.5
9	.029	.119	.969	.150	73.5	83.4	66 0	17.4
10	.014	.085	.944	.141	74.0	84.2	67.6	16.6
11	29.996	.062	.931	.131	74.6	85.6	66.3	19.3
12	30.015	.082	.966	.116	74.7	85.1	67.4	17.7
13	29.958	.048	.881	.167	75.6	87.8	68.4	19.4
14	*Sunday.*							
15	.822	29.899	.768	.131	76.0	85.2	68.6	16.6
16	.775	.852	.696	.156	75.7	83.2	69.6	13.6
17	.734	.798	.622	.176	76.0	82.4	69.6	12.8
18	.847	.927	.792	.135	65.5	72.2	61.2	11.0
19	.839	.898	.779	.119	67.2	77.2	57.6	19.6
20	.867	.940	.811	.129	70.9	80.6	62.6	18.0
21	*Sunday.*							
22	.965	30.037	.903	.134	71.3	80.6	62.2	18.4
23	.868	29.953	.798	.155	74.3	82.2	68.6	13.6
24	.799	.879	.713	.166	76.0	84.2	69 5	14.7
25	.791	.884	.734	.150	74.1	81.8	67.6	14.2
26	.824	.911	.770	.141	74.5	83.8	65.6	18.2
27	.806	.893	.745	.148	75.5	84.2	69.2	15.0
28	*Sunday.*							
29	.821	.900	.752	.148	78.4	87.2	70.6	16.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	63.6	4.4	60.1	7.9	0.525	5.80	1.73	0.77
2	65.8	4.0	62.6	7.2	.570	6.28	.67	.79
3	66.9	4.9	63.0	8.8	.578	.33	2.12	.75
4	64.8	7.0	59 2	12.6	.509	5.58	.87	.66
5	60.0	8.3	53.4	14 9	.419	4.63	.97	.61
6	59.9	8.3	53.3	14.9	.418	.62	.96	.61
7	*Sunday.*							
8	65.2	6.5	60.0	11.7	.523	5.73	.70	.68
9	67.1	6.4	62.6	10.9	.570	6.23	.67	.70
10	68.1	5.9	64.0	10.0	.597	.52	.52	.72
11	68.0	6.6	63.4	11.2	.586	.39	.81	.70
12	67.6	7.1	62.6	12.1	.570	.22	3.01	.67
13	69.2	6.4	64.7	10.9	.611	.65	2.83	.70
14	*Sunday.*							
15	69.3	6.7	64.6	11.4	.609	.63	.97	.69
16	70.3	5.4	66.5	9.2	.618	7.06	.45	.74
17	70.5	5.5	66.6	9.4	.651	.08	.52	.74
18	57.3	8.2	50.7	14.8	.382	4.25	.73	.61
19	59.8	7.4	53.9	13.3	.426	.72	.63	.64
20	63.1	7.8	56.9	14.0	.472	5.17	3.06	.63
21	*Sunday.*							
22	64.2	7.1	58.5	12.8	.498	.45	2.88	.65
23	68.9	5.4	65.1	9.2	.619	6.77	.35	.74
24	69 9	6.1	65.6	10.4	.630	.86	.74	.72
25	65.4	8.7	59.3	14.8	.511	5.57	3.50	.61
26	63.8	10.7	56.3	18.2	.462	.04	4.14	.55
27	65.1	10.4	57.8	17.7	.486	.28	.18	.56
28	*Sunday.*							
29	71.2	7.2	66.2	12.2	.612	6.95	3.36	.67

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.941	30.147	29.760	0 387	68.9	76.0	61.8	14.2
1	.937	.138	.747	.391	68.2	75.7	60 8	14.9
2	.935	.132	.747	.385	67 6	75.0	60.0	15.0
3	.925	.127	.728	.399	67.2	74.6	59.5	15.1
4	.896	.102	.718	.384	67.3	74.0	59.0	15.0
5	.920	.127	.729	.398	66.1	73.4	58.5	14.9
6	.944	.148	.757	.391	65.7	73.6	57.6	16.0
7	.962	.177	.765	.412	65.5	73.6	57 6	16.0
8	.991	.209	.785	.424	67.4	74.6	61.2	13.4
9	30.008	.228	.798	.430	70.4	76.5	62.0	14.5
10	.018	.234	.798	.436	72.9	78.9	63.2	15.7
11	.003	.212	.778	.434	75.6	80.6	65.0	15.6
Noon.	29.974	.184	.742	.442	78.4	83.2	69.0	14.2
1	.941	.138	.716	.422	80.3	85.9	71.2	14.7
2	.911	.104	.676	.428	81.4	87.0	71.2	15.8
3	.889	.082	.631	.451	81.8	87.8	71.4	16.4
4	.882	.072	.622	.450	81.2	86.8	72.2	14.6
5	.882	.078	.635	.443	79.4	86.4	70.0	16.4
6	.888	.083	.645	.438	76.8	83.6	67.6	16.0
7	.907	.104	.691	.413	74.6	81.0	66.0	15.0
8	.926	.135	.746	.389	72.9	79.6	64.4	15.2
9	.943	.144	.760	.384	71.5	78.0	63.0	15.0
10	.950	.153	.773	.380	70.7	77.4	62.6	14.8
11	.949	.159	.766	.393	69.9	77.2	62.2	15.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	64.7	4.2	61.3	7.6	0.546	6.02	1.72	0.78
1	64.3	3.9	61 2	7.0	.544	.01	.57	.79
2	64.1	3.5	61.3	6.3	.546	.05	.39	.81
3	64.0	3.2	61.4	5.8	.548	.07	.28	.83
4	64.3	3.0	61.9	5.4	.557	.17	.20	.84
5	63.2	2.9	60 9	5.2	.539	5.98	.12	.84
6	62.9	2.8	60.7	5.0	.536	.94	.08	.85
7	62.6	2.9	60.3	5.2	.528	.87	.11	.84
8	63.3	4.1	60.0	7.4	.523	.79	.60	.78
9	64.6	5.8	60.0	10.4	.523	.75	2.35	.71
10	65.4	7.5	59.4	13.5	.513	.60	3.13	.64
11	66.5	9.1	60.1	15.5	.525	.70	.78	.60
Noon.	67.5	10.9	59.9	18.5	.521	.63	4.68	.55
1	68.0	12.3	59.4	20.9	.513	.52	5.39	.51
2	68.3	13.1	59.1	22.3	.508	.46	.81	.48
3	68.5	13.3	59.2	22.6	.509	.47	.93	.48
4	68.2	13.0	59.1	22.1	.508	.46	.75	.49
5	68.2	11.2	60.4	19.0	.530	.72	4.90	.54
6	68.2	8.6	62.2	14.6	.563	6.10	3.73	.62
7	67.5	7.1	62.5	12.1	.568	.20	.00	.67
8	66.7	6.2	61 7	11.2	.554	.05	2.68	.69
9	66 2	5.3	62.0	9.5	.559	.13	.25	.73
10	65 8	4.9	61.9	8.8	.557	.12	.06	.75
11	65.5	4.4	62.0	7.9	.559	.15	1.83	.77

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches		lbs	
1	127.3	...	W. & S.	¼	Cloudless till 5 A. M. Scatd. clouds till 5 P. M. cloudless afterwards also foggy from 5 to 10 A. M.
2	133.0	...	S. W. & W.	¼	Cloudless till 7 A. M. cloudy till 11 A. M., cloudless afterwards also slightly foggy at 10 & 11 A. M.
3	133.6	...	S. & S. W. & W.	¼	Cloudless till 3 A. M. Scatd. clouds till 7 P. M., cloudless afterwards also slightly drizzling at 7 P. M.
4	134.0	...	N. & N. W.	...	Scatd. clouds till 8 A. M., cloudless afterwards.
5	135.6	...	N. & S. W.	¼	Cloudless.
6	138.0	...	N. & S. & W.	½	Cloudless.
7	...	...	*Sunday.*	¾	
8	137.8	...	S. W. & S.	¼	Cloudless till 4 A. M., cloudy & foggy till 7 A. M. cloudless afterwards.
9	138.8	...	S. & W.	...	Cloudless; also foggy from 3 to 7 A. M.
10	139.8	...	S. & W.	...	Cloudless; also foggy from 5 to 7 A. M.
11	144.0	...	S. W. & S.	¼	Cloudless; also foggy from 1 to 7 A. M.
12	141.2	...	S.	½	Cloudless till 2 A. M. cloudy & foggy till 8 A. M., cloudless afterwards.
13	140.3	...	S. & S. W.	1	Cloudless; also slightly foggy between 2 & 4 A. M.
14	...	...	*Sunday.*	1	
15	135.8	...	S.	½	Cloudless.
16	133.0	...	S.	4¾	Scatd. _i till 4 A. M., cloudless till 4 P. M. Scatd. clouds afterwards.
17	124.0	0.38	S. & N.	13¾	Scatd. clouds till 4 P. M., cloudy afterwards; also raining at 3 A. M. & at 8 P. M.
18	...	...	N. & N. W.	2	Scatd. \i & _i till 5 A. M., cloudy till 6 P. M., cloudless afterwards.
19	133.0	...	N. E. & S.	½	Cloudless till 1 P. M. Scatd. _i afterwards.
20	134.0	...	E. & N. E. & S. E.	¼	Scatd. \⌒i till 6 A. M. Scatd. _i afterwards.
21	...	...	*Sunday.*	1¾	
22	134.0	...	N. & N. E. & N. W.	¼	Scatd. _i till 1 P. M., cloudy afterwards; also slightly drizzling at 10 P. M
23	131.0	...	Variable.	¼	Cloudy till 11 A. M.; Scatd. ⌒i till 5 P. M. cloudless afterwards; also slightly drizzling at 1 A. M.

\i Cirri, _i Cirro strati, ⌒i Cumuli, ⌒_i Cumulo strati, _i Nimbi, —i Strati \⌒ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
24	140.0	0.09	W. & S.	$13\frac{1}{2}$	Cloudy till 7 A. M., cloudless till 1 P. M., cloudy afterwards, also foggy from 5 to 8 A. M. and raining and lightning at 8 P. M.
25	132.0	...	S. & W.	1	Cloudy till 2 A. M.; cloudless afterwards.
26	138.9	...	N. W. & S. & W.	$1\frac{1}{4}$	Cloudless.
27	139.0	...	N. & S. & W.	$\frac{1}{4}$	Cloudy till 7 A. M.; cloudless afterwards.
28	...	...	*Sunday.*	$\frac{1}{4}$	
29	141.3	...	S	$\frac{1}{2}$	Cloudless till 4 A. M. Scatd. clouds till 2 P. M.; Scatd. ^i till 7 P. M. cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

Monthly Results.

				Inches
Mean height of the Barometer for the month, ..		..	..	29.939
Max. height of the Barometer occurred at 10 A. M. on the 5th,			..	30.234
Min. height of the Barometer occurred at 4 P. M. on the 17th,			..	29.622
Extreme range of the Barometer during the month,		..	..	0.612
Mean of the Daily Max. Pressures, .	..	..	..	30.018
Ditto ditto Min. ditto, ..	..	..	..	29.873
Mean daily range of the Barometer during the month,		..	..	0.145

				o
Mean Dry Bulb Thermometer for the month, ..		..	..	72.7
Max. Temperature occurred at 3 P. M. on the 13th,		..	..	87.8
Min. Temperature occurred at 6 & 7 A. M. on the 19th,		..	..	57.6
Extreme range of the Temperature during the month,		..	..	30.2
Mean of the daily Max. Temperature,	..	..	..	82.1
Ditto ditto Min. ditto, ..	..	..	..	65.2
Mean daily range of the Temperature during the month, ..			..	16.9

				Inches
Mean Wet Bulb Thermometer for the month, ..		..	..	65.8
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..				6.9
Computed Mean Dew-point for the month,	..	..	..	60.3
Mean Dry Bulb Thermometer above computed Mean Dew-point,			..	12.4
Mean Elastic force of Vapour for the month, ..		..	..	0.528

				Troy grains
Mean Weight of Vapour for the month,	..	..	..	5.79
Additional Weight of Vapour required for complete saturation,			..	2.89
Mean degree of humidity for the month, complete saturation being unity,				0.67

				Inches
Rained 5 days, Max. fall of rain during 24 hours,		..	..	0.38
Total amount of rain during the month,	..	..	..	0.47
Total amount of rain indicated by the gauge attached to the Anemometer during the month,	..	..	..	0.35
Prevailing direction of the Wind, ..	..	..	S. & W.	

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of February, 1864.

MONTHLY RESULTS.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	3				1				12		1		3		3				2
1	3						1		11		3		3		3	1			1
2	3						1		10		4		3		3				1
3	3						1		10	1	3		2		2				4
4	1						2		9		3		2		4				4
5	4		1				2		7		2		2		5				2
6	4		1		1		3		8		2		3		3				
7	4		1		1		1		9		2		3		4				
8	6		3		2				7		3				3				1
9	8		3		2				6		3		1		2				
10	7		4		2				7		2				3				
11	7		1		4		1		5		3		3		1				
Noon.	4		3				1		6		4		6		1				
1	2		2		1				6		3		11						
2	4				2		1		3		4		9		2				
3	4				1		2		2		6		10						
4	2		3				1		2		7		10						
5	1		2		1				8		5		8						
6	1		3						11		5		4		1				
7	2		3						11	1	5		2		2				
8	2	1	2						13	1	4		2		2				
9	2		1		1				14		4		2		1				
10	2				2		1	1	15		2		2		1				
11	2				2		1		15		2		2		1				

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.905	29.975	29.833	0.142	77.2	85.3	69.6	15.7
2	.948	30.042	.897	.145	73.5	83.6	63.4	20.2
3	.919	29.980	.852	.128	74.5	83.7	64 6	19.1
4	.963	30.042	.895	.147	76.4	85.6	68.8	16.8
5	30.036	.124	.987	.137	73.6	85.1	61.2	23.9
6	*Sunday.*							
7	29.947	.031	.873	.158	76.2	86.6	67.9	18.7
8	.896	29.968	.827	.141	77.2	89.5	67.4	22.1
9	.918	.980	.861	.119	79.2	88.9	72.4	16.5
10	.970	30.052	.914	.138	77.4	84.4	71.6	12.8
11	.935	.040	.844	.196	77.5	88.1	70.0	18.1
12	.921	29.992	.864	.128	78.3	87.8	69.8	18.0
13	*Sunday.*							
14	.827	.910	.743	.167	79.0	87.6	73.0	14.6
15	.813	.874	.763	.111	80.8	90.5	74.7	15.8
16	.870	.956	.811	.145	82.7	92.8	74.4	18.4
17	.828	.911	.753	.158	82.6	91.7	75.8	15.9
18	.811	.902	.752	.150	80.7	89.0	74.2	14.8
19	.870	.955	.809	.146	77.9	88.0	70.0	18.0
20	*Sunday.*							
21	.865	.945	.784	.161	80.3	91.6	71.6	20.0
22	.846	.927	.766	.161	81.5	91.8	74.0	17.8
23	.816	.897	.731	.166	82.2	91.8	76 3	15.5
24	.790	.866	.712	.154	81.3	91.5	72.8	18.7
25	.814	.882	.753	.129	82.9	92.3	76.2	16.1
26	.876	.946	.835	.111	81.9	89.0	76.8	12.2
27	*Sunday.*							
28	.822	.914	.764	.150	79.1	88.4	71.1	17.3
29	.826	.896	.768	.128	78.9	88.2	69.8	18.4
30	.838	.907	.774	.133	80.5	91.0	71 2	19 8
31	.841	.929	.757	.172	82.3	91.8	75.6	16.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	66.5	10.7	59.0	18.2	0.506	5.49	4.46	0 55
2	61.4	12.1	52.9	20.6	.412	4.50	.40	.51
3	67.4	7.1	62.4	12.1	.567	6.18	3.00	.67
4	65.8	10.6	58.4	18.0	.496	5.38	4.34	.55
5	62.2	11.4	54.2	19.4	.431	4.70	.23	.53
6	*Sunday.*							
7	66.6	9.6	59.9	16.3	.521	5.66	.00	.59
8	68.5	8.7	62.4	14.8	.567	6.14	3.81	.62
9	73.5	5.7	69.5	9.7	.715	7.72	2.84	.73
10	70.5	6.9	65.7	11.7	.632	6.85	3.16	.68
11	69.4	8.1	63.7	13.8	.591	.41	.63	.64
12	69.3	9.0	63.0	15.3	.578	.26	4.02	.61
13	*Sunday.*							
14	73.8	5.2	70.2	8.8	.732	7.91	2.59	.75
15	74.1	6.7	69.4	11.4	.713	.69	3.38	.70
16	73.2	9.5	66.5	16.2	.648	6.96	4.76	.59
17	74.7	7.9	69.2	13.4	.708	7.61	.07	.65
18	68.5	12.2	60.0	20.7	.523	5.62	5.42	.51
19	65.1	12.8	56.1	21.8	.459	4.97	.19	.49
20	*Sunday.*							
21	69.2	11.1	61.4	18.9	.548	5.91	.00	.54
22	73.8	7.7	68.4	13.1	.690	7.42	3.89	.66
23	76.4	5.8	72.3	9.9	.783	8.41	.13	.73
24	75.9	5.4	72.1	9.2	.778	.38	2.86	.75
25	76.1	6.8	71.3	11.6	.758	.13	3.66	.69
26	76.8	5.1	73.2	8.7	.806	.66	2.78	.76
27	*Sunday.*							
28	71.3	7.8	65.8	13.3	.634	6.86	3.67	.65
29	71.8	7.1	66.8	12.1	.655	7.09	.38	.68
30	73.0	7.5	67.7	12.8	.674	.27	.71	.66
31	75.9	6.4	71.4	10.9	.761	8.17	.41	.71

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.877	30.040	29.793	0.247	75.0	80.5	68.4	12.1
1	.868	.013	.776	.237	74.2	80.0	66 9	13.1
2	.848	29.966	.756	.210	74.0	79.4	66.4	13.0
3	.846	30.008	.752	.256	73.3	79.0	64.6	14.4
4	.846	.016	.765	.251	72.7	78.0	63.2	14.8
5	.863	.029	.781	.248	72.2	77.4	62.0	15.4
6	.881	.043	.792	.251	71.7	76.8	61.2	15.6
7	.904	.074	.824	.250	72.1	77.8	62.2	15.6
8	.931	.099	.850	.249	75.4	79.8	68.4	11.4
9	.950	.118	.866	.252	78.5	83.4	73.2	10.2
10	.953	.124	.861	.263	81.2	85.5	75.4	10.1
11	.943	.102	.843	.259	83.6	87.9	77.6	10.3
Noon.	.917	.082	.814	.268	85.7	90.2	80.4	9.8
1	.886	.049	.774	.275	87.3	91.7	81.2	10.5
2	.856	.013	.745	.268	88.1	91.8	81.9	9.9
3	.833	29.988	.725	.263	88.5	92.8	83.6	9.2
4	.822	.995	.719	.276	88.0	92.4	82.4	10.0
5	.822	30.012	.718	.294	86.1	90.8	82.0	8.8
6	.828	29.987	.712	.275	82.6	86.8	72.8	14.0
7	.845	.994	.757	.237	80.1	85.4	74.2	11.2
8	.866	30.011	.782	.229	78.6	83.0	73.0	10.0
9	.885	.017	.798	.219	77.0	81.7	71.2	10.5
10	.897	.049	.803	.246	76.2	81.0	70.0	11.0
11	.898	.052	.795	.257	75.1	79.8	68.4	11.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	70.7	4.3	67.7	7.3	0.674	7.36	1.95	0.79
1	70.2	4.0	67.4	6.8	.668	.29	.80	.80
2	70.3	3.7	67.7	6.3	.674	.37	.67	.82
3	69.6	3.7	66.6	6.7	.651	.11	.73	.80
4	69.2	3.5	66.4	6.3	.646	.08	.60	.82
5	68.7	3.5	65.9	6.3	.636	6.98	.57	.82
6	68.1	3.6	65.2	6.5	.621	.81	.62	.81
7	68.1	4.0	64.9	7.2	.615	.75	.78	.79
8	69.4	6.0	65.2	10.2	.621	.77	2.66	.72
9	70.7	7.8	65.2	13.3	.621	.73	3.62	.65
10	71.1	10.1	64.0	17.2	.597	.42	4.79	.57
11	71.4	12.2	62.9	20.7	.576	.16	5.87	.51
Noon.	71.9	13.8	62.2	23.5	.563	5.99	6.81	.47
1	72.0	15.3	62.8	24.5	.574	6.10	7.31	.46
2	72.5	15.6	63.1	25.0	.580	.15	.57	.45
3	72.3	16.2	62.6	25.9	.570	.05	.83	.44
4	72.4	15.6	63.0	25.0	.578	.13	.55	.45
5	72.5	13.6	63.0	23.1	.578	.15	6.80	.48
6	72.1	10.5	64.7	17.9	.611	.56	5.12	.56
7	71.7	8.4	65.8	14.3	.634	.84	4.00	.63
8	71.5	7.1	66 5	12.1	.648	7.02	3.36	.68
9	71.1	5.9	67.0	10.0	.659	.15	2.74	.72
10	70.9	5 3	67.2	9.0	.664	.22	.44	.75
11	70.6	4.5	67.4	7.7	.668	.27	.07	.78

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
1	137.3	...	N. & N. W.	¼	Cloudless.
2	136.4	...	N. & N. W.	¼	Cloudless.
3	129.5	...	W. & N. W.	...	Cloudless till 9 A. M., cloudy till 7 P. M., cloudless afterwards.
4	138.0	0.37	N. & N. W.	½	Cloudy till 7 A. M.; cloudless afterwards; also raining at 1 & 2 A. M. & foggy at 10 & 11 P. M.
5	141.7	...	N. &. W.	...	Cloudless; also foggy at Midnight and 1 A. M.
6	...	...	*Sunday.*	...	
7	140.0	...	W.	2¾	Cloudless.
8	144.0	...	S. & S. W.	...	Cloudless; also slightly foggy at 5 & 6 A. M.
9	146.9	...	S.	2	Cloudy till 9 A. M.; Scatd. ⌞i till 7 P. M.; cloudless afterwards.
10	...	...	N. W.	4¾	Cloudless till 5 A. M. cloudy afterwards.
11	135.0	0.09	S. W. & W.	3	Cloudy till 9 A. M., Scatd. ⌞i till 7 P. M.; cloudless afterwards also raining at 2 A. M.
12	139.0	...	W. & E.	¼	Cloudless.
13	...	0.09	*Sunday.*	1¾	
14	135.0	...	S. & S. W.	3¾	Cloudless till 5 A. M. Scatd. clouds afterwards, also lightning at midnight & 8 P. M.
15	139.0	...	S. & S. W.	¾	Cloudless till 3 A. M., cloudy till 9 A. M.; cloudless till 2 P. M. Scatd. \i till 7 P. M. cloudless afterwards.
16	138.5	...	S. & W.	½	Cloudless till 10 A. M.; Scatd. \i & ⌞i till 7 P. M. cloudless afterwards.
17	137.4	...	S. W. & W.	1¼	Cloudless till 5 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.
18	137.0	...	N. W. & S.	1½	Cloudless till 5 A. M. Scatd. ⌞i till 11 A. M., cloudless afterwards.
19	133.0	...	N. W. & S. W.	2¼	Cloudless till 11 A. M. Scatd. \i & ⌞i till 3 P. M.; cloudless afterwards.
20	...	...	*Sunday.*	...	
21	144.3	...	W. & S. W.	...	Cloudless; also slightly foggy at 6 & 7 A. M.
22	133.8	...	S. W. & W. & S.	...	Cloudless.
23	130.0	...	S. & S. W.	2	Scatd. clouds; also thundering at 5 P. M. & lightning at 7 P. M.

\i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌒⌞i Cumulo strati, ⌞⌒i Nimbi, —i Strati, ⌒\i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
24	132.0	1.22	S. & S. E.	5	Cloudless till 5 A. M.; Scatd. ^i & ⌊i till 4 P. M. cloudy afterwards also thundering, lightning, raining with a heavy fall of hail-stones at 5 & 6 P. M.
25	135.0	...	S. & N.	1	Scatd. clouds till 9 A. M.; cloudless till 3 P. M., cloudy afterwards.
26	...	...	S.	$\frac{3}{4}$	Cloudless till 5 A. M. Scatd. clouds afterwards.
27	...	0.07	*Sunday.*	$16\frac{1}{2}$	
28	126.0	...	S. & S. W.	20	Cloudy till 5 A. M.; Scatd. ⌊i till 6 P. M. cloudy with thunder, and lightning afterwards; also slightly drizzling at 8 & 9 P. M.
29	128.0	...	S. W. & S.	$6\frac{1}{4}$	Scatd. clouds till 5 A. M.; cloudless till 11 A. M. Scatd. ⌊i & ^i till 7 P. M. overcast afterwards.
30	136.0	...	S.	$1\frac{1}{4}$	Scatd. clouds till 3 A. M.; cloudless afterwards.
31	131.0	...	S.	$1\frac{1}{2}$	Cloudless till 6 A. M.; Scatd. ^i & ⌊i afterwards; also slightly drizzling between 9 & 10 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Monthly Results.

		Inches
Mean height of the Barometer for the month, ..	.. ..	29.878
Max. height of the Barometer occurred at 10 A. M. on the 5th,	..	30.124
Min. height of the Barometer occurred at 6 P. M. on the 24th,	..	29.712
Extreme range of the Barometer during the month,	.. ..	0.412
Mean of the Daily Max. Pressures, ..	.. .. ..	29.957
Ditto ditto Min. ditto, ..	.. .. ..	29.812
Mean daily range of the Barometer during the month,	.. ..	0.145

		o
Mean Dry Bulb Thermometer for the month, ..	.. ..	79.1
Max. Temperature occurred at 3 P. M. on the 16th,	.. ..	92.8
Min. Temperature occurred at 6 A. M. on the 5th,	.. ..	61.2
Extreme range of the Temperature during the month,	.. ..	31.6
Mean of the daily Max. Temperature,	.. .. ..	88.7
Ditto ditto Min. ditto, ..	.. .. ..	71.3
Mean daily range of the Temperature during the month, ..	..	17.4

		Inches
Mean Wet Bulb Thermometer for the month, ..	.. ..	70.8
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,	..	8.3
Computed Mean Dew-point for the month,	.. .. ..	65.0
Mean Dry Bulb Thermometer above computed Mean Dew-point,	..	14.1
Mean Elastic force of Vapour for the month, ..	.. ..	0.617

		Troy grains
Mean Weight of Vapour for the month,	.. .. ..	6.68
Additional Weight of Vapour required for complete saturation,	..	3.85
Mean degree of humidity for the month, complete saturation being unity,		0.63

		Inches
Rained 8 days, Max. fall of rain during 24 hours,	.. ..	1.22
Total amount of rain during the month,	.. .. ..	1.84
Total amount of rain indicated by the gauge attached to the Anemometer during the month,	.. ..	1.55
Prevailing direction of the Wind, ..	.. ..	S. & S. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1864.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
	No. of days.																		
Midnight.	1								13		5		3		2				3
1	1								15		6		3	1	2				
2	1								14		7	1	3	1	1				1
3	3								14		6		2		2				
4	4						1		12		7				1				2
5	3						1		12		5		3		2				1
6	4						1		10		6		3		3				
7	3				1		1		9		9		1		3				
8	4		1		1		1		9		7		2		2				
9	5				2				7		9		2		2				
10	4				1				9		7		4		2				
11	4						1		5		4		8		5				
Noon.	4				1		3		5		7		5		2				
1	3						1		6		7		6		4				
2	3								7		3		9		5				
3	4								7		2		12		2				
4	2				1		1		4		3		10		5				1
5	1						1	1	6		7		7		5				
6	1				1		2	1	8		5		4		5		1		
7	2				1		2		9		4		3	1	5		1		
8	1				1		4		9	1	4		3		5				
9	1				1		3		12	1	4		2		4				
10	1				1		3	1	11		5		2		4				
11	1				1		3	1	9		4		2		4		1		2

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.829	29.896	29.764	0.132	81.7	92.2	74.6	17.6
2	.873	.939	.819	.120	84.5	94.0	78.0	16.0
3	*Sunday.*							
4	.822	.894	.751	.143	86.0	97.8	77.4	20.4
5	.801	.866	.724	.142	86.2	97.4	76.5	20.9
6	.751	.832	.667	.165	86.4	97.6	78.6	19.0
7	.702	.767	.624	.143	87.1	98.8	77.2	21.6
8	.717	.822	.623	.199	83.7	92.2	74.2	18.0
9	.739	.800	.680	.120	81.4	93.2	72.8	20.4
10	*Sunday.*							
11	.780	.845	.721	.124	85.7	96.4	77.5	18.9
12	.758	.845	.678	.167	87.1	99.8	78.0	21.8
13	.692	.780	.610	.170	88.5	101.2	78.6	22.6
14	.682	.735	.606	.129	84.8	96 8	77.6	19.2
15	.748	.890	.648	.242	80.1	88.4	75.6	12.8
16	.774	.855	.713	.142	82.4	92.8	73.8	19.0
17	*Sunday.*							
18	.749	.821	.671	.150	86.8	97.8	79.4	18.4
19	.704	.782	.635	.147	86.6	96.5	78.0	18.5
20	.708	.805	.638	.167	85.0	93.6	77.9	15.7
21	.731	.814	.659	.155	84.3	93.3	78.0	15.3
22	.769	.830	.716	.114	85.1	94.8	80.0	14.8
23	.804	.867	.748	.119	85.2	94.7	79.4	15.3
24	*Sunday.*							
25	.685	.764	.601	.163	87.7	98.6	80.2	18.4
26	.637	.731	.578	.153	90.5	103.6	80.2	23.4
27	.633	.708	.555	.153	89.3	101.6	81.0	20.6
28	.674	.739	.605	.134	87.6	98.0	80.0	18.0
29	.739	.813	.650	.163	86.5	94.8	78.2	16.6
30	.783	.844	.711	.133	83.9	94.8	74.2	20.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	75.4	6.3	71.0	10.7	0.751	8.07	3.30	0 71
2	78.1	6.4	73.6	10.9	.817	.73	.62	.71
3	*Sunday.*							
4	76.2	9.8	69.3	16.7	.711	7.56	5.35	.59
5	76.0	10.2	68.9	17.3	.701	.48	.51	.58
6	77.0	9.4	70.4	16.0	.736	.84	.22	.60
7	74.8	12.3	67.4	19.7	.668	.09	6.24	.53
8	71.4	12.3	62.8	20.9	.574	6.14	5.93	.51
9	73.5	7.9	68.0	13.4	.681	7.33	3.94	.65
10	*Sunday.*							
11	78.0	7.7	72.6	13.1	.790	8.43	4.37	.66
12	77.0	10.1	70.9	16.2	.748	7.97	5.36	.60
13	76.2	12.3	68.8	19.7	.699	.40	6.48	.53
14	72.8	12.0	64.4	20.4	.605	6.47	5.99	.52
15	71.8	8.3	66.0	14.1	.638	.88	3.96	.64
16	73.9	8.5	67.9	14.5	.679	7.28	4.33	.63
17	*Sunday.*							
18	78.0	8.8	72.7	14.1	.792	8.44	.77	.64
19	76.6	10.0	70.6	16.0	.741	7.89	5.25	.60
20	73.8	11.2	66.0	19 0	.638	6.81	.72	.54
21	76.9	7.4	71 7	12.6	.768	8.21	4.07	.67
22	78.0	7.1	73.0	12.1	.801	.55	.02	.68
23	78.5	6.7	73.8	11.4	.822	.78	3.83	.70
24	*Sunday.*							
25	80.2	7.5	75.7	12.0	.873	9.28	4.28	.68
26	74.4	16.1	64.7	25.8	.611	6.15	8.27	.44
27	79.1	10.2	73.0	16.3	.801	8 48	5.73	.60
28	79.7	7.9	75.0	12.6	.854	9.07	4.45	.67
29	78.7	7.8	74.0	12.5	.827	8.80	.30	.67
30	76 3	7.6	71.0	12.9	.751	.04	.09	.66

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.749	29.863	29.605	0.258	80.3	83.8	74.0	9.8
1	.732	.855	.597	.258	80.0	83.2	73.7	9.5
2	.722	.849	.588	.261	79.6	83.6	73.5	10.1
3	.714	.845	.589	.256	79.0	83.0	73.2	9.8
4	.714	.850	.605	.245	78.8	82.8	72.8	10.0
5	.728	.861	.622	.239	78.5	82.0	73.2	8.8
6	.749	.872	.643	.229	78.3	81.6	73.8	7.8
7	.773	.898	.668	.230	79.3	82.6	74.8	7.8
8	.795	.904	.701	.203	82.7	87.0	76.4	10.6
9	.811	.925	.707	.218	85.5	90.0	77.2	12.8
10	.814	.939	.708	.231	88.5	95.4	78.0	17.4
11	.804	.931	.689	.242	91.0	99.6	76.4	23.2
Noon.	.781	.912	.663	.249	93.2	102.0	78.0	24.0
1	.754	.885	.632	.253	94.8	102.6	83.8	18.8
2	.728	.861	.603	.258	95.5	103.2	84.6	18.6
3	.700	.830	.581	.249	95.5	103.6	83.5	20.1
4	.679	.821	.556	.265	94.6	102.9	87.3	15.6
5	.678	.819	.555	.264	91 9	101.6	82.0	19.6
6	.685	.829	.568	.261	88.7	96.2	79.2	17.0
7	.703	.840	.578	.262	86.2	92.6	79.0	13.6
8	.726	.873	.620	.253	83.8	88.0	74.2	13.8
9	.744	.892	.635	.257	82.9	86.4	75.6	10.8
10	.755	.900	.649	.251	81.8	85.8	74.7	11.1
11	.752	.893	.640	.253	81.0	84.8	74.8	10.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Midnight.	75.5	4.8	72.1	8.2	0.778	8.39	2.52	0.77
1	75.2	4.8	71.8	8 2	.771	.31	.50	.77
2	74.9	4.7	71.6	8.0	.766	.27	.42	.77
3	74.7	4.3	71.7	7.3	.768	.31	.19	.79
4	74.4	4.4	71.3	7.5	.758	.20	.24	.79
5	74.2	4.3	71.2	7.3	.756	.18	.17	.79
6	74.1	4.2	71.2	7.1	.756	.18	.10	.80
7	74.8	4.5	71.6	7.7	.766	.27	.32	.78
8	76.0	6.7	71.3	11.4	.758	.15	3.57	.70
9	76.7	8.8	70.5	15.0	.739	7.89	4.83	.62
10	77.1	11.4	70.3	18.2	.734	.79	6.09	.56
11	77.4	13.6	69.2	21.8	.708	.47	7.46	.50
Noon.	77.6	15.6	68.2	25.0	.686	.21	8.69	.45
1	77.7	17.1	67.4	27.4	.668	.00	9.65	.42
2	77.9	17.6	67.3	28.2	.666	6.96	10.03	.41
3	77.6	17.9	66.9	28.6	.657	.87	.12	.40
4	77.8	16.8	67.7	26.9	.674	7.06	9.49	.43
5	77.3	14.6	68.5	23.4	.692	.30	8.02	.48
6	77.5	11.2	70.8	17.9	.716	.90	6.06	.57
7	76.6	9.6	69.9	16.3	.725	.72	5.27	.59
8	76.3	7.5	71.0	12.8	.751	8.04	4.06	.66
9	76.3	6.6	71.7	11.2	.768	.24	3.55	.70
10	76.1	5.7	72.1	9.7	.778	.36	.04	.73
11	75.7	5.3	72.0	9.0	.776	.35	2.79	.75

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
1	129.0	0.13	S.	$8\frac{1}{4}$	Cloudless till 6 A. M. Scatd. ⌣i till 4 P. M. cloudy with thundering and raining at 5 P. M. cloudless afterwards.
2	140.0	...	S.	$\frac{1}{2}$	Cloudless till 2 A. M. Scatd. ⌣i & ∩i till 4 P. M. cloudless afterwards.
3	...	...	*Sunday.*	$\frac{1}{4}$	
4	139.5	...	S. & W.	$\frac{1}{4}$	Cloudless till 2 P. M. Scatd. \i till 6 P. M. cloudless afterwards.
5	142.0	...	E. & S.	0	Cloudless till 10 A. M. Scatd. \i & ⌣i till 6 P. M. cloudless afterwards also foggy at 6 & 7 A. M.
6	137.0	...	S. & N. W. & N.	0	Cloudless till 5 A. M. Scatd. ⌣i & ∩i till 4 P. M. cloudless afterwards.
7	145.0	...	W. & S. & S. W.	$8\frac{1}{4}$	Cloudless till 1 P. M. cloudy afterwards, also thundering & lightning at 8 P. M. & drizzling at 10 P. M.
8	...	0.20	S. W. & S.	$12\frac{1}{4}$	Cloudy; also thundering, lightning & raining at 8 & 9 P. M.
9	130.5	...	S.	1	Cloudy till noon; cloudless till 4 P. M. Scatd. ⌣i till 8 P. M. cloudless afterwards.
10	...	...	*Sunday.*	$2\frac{1}{4}$	
11	134.4	...	S. & S. W.	0	Cloudless.
12	140.0	...	S. & S. W.	$\frac{3}{4}$	Cloudless till 4 A. M. Scatd. ⌣i & \i afterwards.
13	142.0	...	S. & W.	$\frac{1}{4}$	Cloudless.
14	131.4	...	S. & N. W. & W.	9	Cloudless till 4 A. M. Scatd. clouds afterwards; also thundering and drizzling at 5 P. M.
15	...	...	S. & W.	11	Cloudless till 6 A. M. cloudy till 3 P. M. Scatd. ⌣i after wards also slightly drizzling at 9 & 11 A. M.
16	132.4	...	S. & N.	$\frac{1}{4}$	Cloudy till 7 A. M. Scatd. ⌣i & ∩i till 7 P. M. cloudless afterwards also slightly drizzling at 6 P. M.
17	...	...	*Sunday.*	0	
18	138.0	...	S. & W.	$1\frac{1}{2}$	Cloudless till 3 A. M. Scatd. clouds till 9 A. M. cloudless afterwards.
19	128.7	...	W. & S. W. & S.	$\frac{1}{2}$	Cloudless till 5 A. M. Scatd. ⌣i & \i till 11 A. M. cloudy till 6 P. M. Scatd. ⌣i afterwards.

\i Cirri, ⌣i Cirro strati, ∩i Cumuli, ⌒i Cumulo strati, ⌐i Nimbi, —i Strati, ⌐ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
20	...	...	S. & S. W.	4	Cloudy till 4 P. M. Scatd. ∖—i afterwards.
21	129.7	...	S. & S. W.	5	Scatd. ∖—i till 6 P. M. cloudless afterwards.
22	130.0	...	S. & S. W.	1	Cloudless till 5 A. M. Scatd. ∖—i & ⌃i till 8 P. M. cloudless afterwards; also thundering at 4 P. M.
23	138.4	..	S.	1	Cloudless till 6 A. M. Scatd. ⌃i till 3 P. M Scatd. ∖—i till 7 P. M. cloudless, afterwards.
24	...	...	*Sunday.*	2	
25	137.0	...	S.	$1\frac{3}{4}$	Cloudless.
26	136.8	...	S. & N. W. & S. E.	$2\frac{1}{2}$	Scatd. ∖—i till 3 A. M.; cloudless afterwards.
27	137.0	...	S.	$\frac{3}{4}$	Cloudless till 3 A. M. cloudy till 8 A. M. cloudless afterwards; also hazy from 9 A. M. to 1 P. M.
28	133.0	...	S.	$1\frac{3}{4}$	Cloudless.
29	131.0	...	S.	$5\frac{1}{2}$	Cloudy till 3 A. M. cloudless till 7 A. M. Scatd. ⌃i till 11 A. M. cloudless afterwards; also very slightly drizzling between 7 & 8 P. M.
30	126.0	0.78	S. & S. E.	$12\frac{3}{4}$	Scatd. clouds till 9 A. M. Scatd. ∖—i till 3 P. M. cloudy afterwards also thundering, lightning and raining from 6 to 9 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Monthly Results.

		Inches
Mean height of the Barometer for the month, ..	.. ..	29.741
Max. height of the Barometer occurred at 10 A. M. on the 2nd,	..	29.939
Min. height of the Barometer occurred at 5 P. M. on the 27th,	..	29.555
Extreme range of the Barometer during the month,	.. ..	0.384
Mean of the Daily Max. Pressures, ..	.. .. ..	29.819
Ditto ditto Min. ditto, ..	.. .. ..	29.669
Mean daily range of the Barometer during the month,	.. ..	0.150

		o
Mean Dry Bulb Thermometer for the month, ..	.. ..	85.6
Max. Temperature occurred at 3 P. M. on the 26th,	.. ..	103.6
Min. Temperature occurred at 4 A. M. on the 9th,	.. ..	72.8
Extreme range of the Temperature during the month,	.. ..	30.8
Mean of the daily Max. Temperature,	.. .. ..	96.2
Ditto ditto Min. ditto, ..	.. .. ..	77.6
Mean daily range of the Temperature during the month, ..	..	18.6

		Inches
Mean Wet Bulb Thermometer for the month, ..	.. ..	76.2
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,	..	9.4
Computed Mean Dew-point for the month,	.. .. ..	69.6
Mean Dry Bulb Thermometer above computed Mean Dew-point,	..	16.0
		Inches
Mean Elastic force of Vapour for the month, ..	.. ..	0.717

		Troy grains
Mean Weight of Vapour for the month,	.. .. ..	7.65
Additional Weight of Vapour required for complete saturation,	..	5.11
Mean degree of humidity for the month, complete saturation being unity,		0.60

		Inches
Rained 8 days, Max. fall of rain during 24 hours,	.. ..	0.78
Total amount of rain during the month,	.. .. ..	1.11
Total amount of rain indicated by the gauge attached to the Anemometer during the month,	.. ..	0.93
Prevailing direction of the Wind, ..	.. ..	S.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of April, 1864.

Monthly Results.

Table showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	1						1		19		3		1						1
1	1						2		19		2		1		1				
2	2				1		2		17		2		1						1
3	1				2		3		17		2		1						
4	1				2		3		12		3								5
5	2						3		17		1		1						2
6	2				1		3		16		4								
7	2				1		2		13		4		4						
8	1						1		16		6		2						
9							1		14		6		5	1					
10	2								8		6		9		1				
11	2								9		5		8		2	1			
Noon.	1				1				9		7		6		2				
1	2						1		10		7		6						
2	2				1				7		9		6		1				
3					1		1		10		5		6		3				
4					1				10		7		3		4				1
5					1				14		5		2		4	2			
6					1		1		17	1	3		1		3				
7					1				20				2	1	3				
8	1	1			1		1		19	1	1		1	1	2				
9					3	2			20		2				1				
10					3				20		2	1					1		
11					3				21		2								

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	*Sunday.*							
2	29.691	29.790	29.593	0.197	84.2	95.0	74.6	20.4
3	.705	.762	.635	.127	86.1	94.4	80.6	13.8
4	.719	.788	.657	.131	86.6	95.3	80.6	14.7
5	.697	.762	.624	.138	86.9	97.0	80.4	16.6
6	.669	.719	.580	.139	86.8	98.0	77.6	20.4
7	.677	.734	.619	.115	87.0	98.8	77.8	21.0
8	*Sunday.*							
9	.776	.852	.709	.143	88.1	99.8	79.2	20.6
10	.812	.887	.767	.120	83.3	94.6	79.0	15.6
11	.838	.902	.756	.146	82.1	91.7	75.2	16.5
12	.846	.923	.771	.152	83.7	93.0	75.0	18.0
13	.827	.892	.765	.127	86.7	98.4	79.2	19.2
14	.798	.876	.704	.172	87.1	99.6	78.4	21.2
15	*Sunday.*							
16	.787	.881	.706	.175	82.9	94.0	73.8	20.2
17	.805	.883	.712	.171	82.8	93.6	73.0	20.6
18	.871	.947	.807	.140	79.9	92.0	74.0	18.0
19	.813	.892	.746	.146	81.6	93.6	74.2	19.4
20	.769	.851	.658	.193	83.8	94.0	74.7	19.3
21	.706	.763	.616	.147	87.0	98.2	79.0	19.2
22	*Sunday.*							
23	.663	.739	.580	.159	89.2	101.6	81.2	20.4
24	.582	.645	.500	.145	90.6	104.2	81.4	22.8
25	.583	.645	.533	.112	87.8	96.6	83.0	13.6
26	.647	.703	.602	.101	82.2	95.6	76.6	19.0
27	.686	.749	.614	.135	83.8	92.8	76.0	16.8
28	.686	.748	.596	.152	81.9	93.0	73.2	19.8
29	*Sunday.*							
30	.668	.720	.614	.106	77.2	83.0	74.6	8.4
31	.628	.695	.565	.130	79.9	86.4	75.0	11.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	*Sunday.*							
2	78.1	6.1	73.8	10.4	0.822	8.80	3.44	0 72
3	79.8	6.3	75.4	10.7	.865	9.22	.73	.71
4	80.5	6.1	76.8	9.8	.905	.63	.51	.73
5	80.0	6.9	75.9	11.0	.879	.36	.89	.71
6	79.2	7.6	74.6	12.2	.843	8.98	4.23	.68
7	76.5	10.5	70.2	16.8	.732	7.78	5.51	.59
8	*Sunday.*							
9	76.7	11.4	69.9	18.2	.725	.69	6.03	.56
10	76.0	7.3	70.9	12.4	.748	8.03	3.90	.67
11	73.1	9.0	66.8	15.3	.655	7.04	4.47	.61
12	74.9	8.8	68.7	15.0	.697	.46	.61	.62
13	77.3	9.4	71.7	15.0	.768	8.18	5.00	.62
14	77.5	9.6	71.7	15.4	.768	.18	.15	.61
15	*Sunday.*							
16	75.4	7.5	70.1	12.8	.729	7.82	3.97	.66
17	76.3	6.5	71.7	11.1	.768	8.24	.51	.70
18	75.1	4.8	71.7	8 2	.768	.30	2.48	.77
19	76.0	5.6	72 1	9.5	.778	.36	.98	.74
20	76 9	6.9	72.1	11.7	.778	.33	3.77	.69
21	78.9	8.1	74.0	13.0	.827	.80	4.49	.66
22	*Sunday.*							
23	81.1	8.1	76.2	13.0	.887	9.41	.75	.67
24	80.6	10.0	74.6	16.0	.843	8.91	5.85	.60
25	81.3	6.5	77.4	10.4	.922	9.81	3.79	.72
26	77.4	4.8	74.0	8.2	.827	8.90	2.64	.77
27	77.1	6.7	72.4	11.4	.785	.41	3.69	.70
28	77 2	4.7	73.9	8.0	.824	.87	2.57	.78
29	*Sunday.*							
30	74.8	2.4	73.1	4.1	.803	.72	1.23	.88
31	76.8	3.1	74.6	5.3	.843	9.11	.67	.85

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.733	29.862	29.572	0.290	80.0	85.2	73.8	11.4
1	.719	.828	.553	.275	79.9	84.6	74.0	10.6
2	.715	.841	.541	.300	79.5	84.4	74.6	9.8
3	.708	.853	.546	.307	79.4	84.0	75.0	9.0
4	.699	.857	.549	.308	79.5	83.8	74.0	9.8
5	.728	.872	.550	.322	78.9	83.6	74.0	9.6
6	.744	.893	.579	.314	79.2	84.0	74.0	10.0
7	.762	.915	.593	.322	80.4	85.2	75.2	10.0
8	.778	.930	.604	.326	83.3	86.8	77.8	9.0
9	.793	.937	.636	.301	85.7	89.4	79.3	10.1
10	.795	.947	.645	.302	88.4	93.2	79.8	13.4
11	.782	.939	.629	.310	90.5	97.4	77.6	19.8
Noon.	.765	.917	.611	.306	92.3	99.4	76.4	23.0
1	.741	.877	.586	.291	92.8	101.9	76.0	25.9
2	.711	.837	.562	.275	92.8	102.9	75.6	27.3
3	.682	.809	.531	.278	92.6	104.0	75.2	28.8
4	.665	.832	.506	.326	91.1	104.2	74.8	29.4
5	.664	.848	.500	.348	88.2	101.6	74.6	27.0
6	.675	.842	.501	.341	85.7	95.4	74.6	20.8
7	.694	.852	.524	.328	83.7	91.2	74.6	16.6
8	.714	.869	.545	.324	82.0	88.4	73.0	15.4
9	.730	.883	.555	.328	81.3	87.2	73.2	14.0
10	.746	.892	.571	.321	80.7	86.4	73.8	12.6
11	.738	.887	.582	.305	80.5	86.0	73.6	12.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	76.3	3.7	73.7	6.3	0.819	8.85	1.96	0.82
1	76.5	3.4	74.1	5 8	.830	.96	.82	.83
2	76.2	3.3	73.9	5.6	.824	.90	.76	.84
3	76.2	3.2	74.0	5.4	.827	.95	.67	.84
4	76.3	3.2	74.1	5.4	.830	.98	.68	.84
5	75.8	3.1	73.6	5.3	.817	.84	.63	.84
6	76.1	3.1	73.9	5.3	.824	.92	.64	.85
7	76.8	3.6	74.3	6.1	.835	9.01	.93	.82
8	78.0	5.3	74.3	9.0	.835	8.96	2.97	.75
9	78.9	6 8	74.1	11.6	.830	.85	3.95	.69
10	79.4	9.0	74.0	14.4	.827	.79	5.05	.64
11	80.0	10.5	73.7	16.8	.819	.66	6.06	.59
Noon.	80.6	11.7	73.6	18.7	.817	.59	.91	.55
1	79.9	12.9	72.2	20.6	.781	.19	7.53	.52
2	79.4	13.4	71.4	21.4	.761	.00	.72	.51
3	79.2	13.4	71.2	21.4	.756	7.95	.68	.51
4	78.6	12.5	71.1	20.0	.753	.95	.02	.53
5	77.2	11.0	70.6	17.6	.741	.86	5.90	.57
6	76.9	8.8	70.7	15.0	.744	.93	4.87	.62
7	76.5	7.2	71.5	12.2	.763	8 18	3 89	.68
8	75.9	6.1	71.6	10.4	.766	.23	.24	.72
9	76.1	5.2	72.5	8.8	.787	.47	2.77	.75
10	76.1	4.6	72.9	7.8	.797	.59	.45	.78
11	76.2	4.3	73.2	7.3	.806	.70	.28	.79

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
1	...	...	*Sunday.*	3	
2	128.4	0.37	S.	17½	Cloudless till 3 A. M. cloudy till 9 A. M. Scatd. ⌒i till 4 P. M. cloudy afterwards; also raining between 5 & 6 P. M.
3	140.0	...	S. & S. E.	2¼	Cloudless till 3 A. M. Scatd. clouds till noon, cloudless afterwards.
4	132.2	...	S.	2¼	Cloudless till 11 A. M. Scatd. ⌞i till 7 P M. cloudless afterwards.
5	135.4	...	S.	3½	Cloudless till 4 A. M. Scatd. clouds till 9 A. M cloudless afterwards.
6	136.4	0.09	S.	4	Cloudless till 6 A. M. Scatd. ⌞i till 4 P. M. cloudy afterwards, also thundering and lightning from 9 to 11 P. M. & drizzling between 6 & 7 P. M. and at 10 & 11 P. M.
7	136.0	...	S. & S. W.	2	Cloudy till 11 A. M. Scatd. ⌞i till 7 P. M. cloudy afterwards; also drizzling from 9 to 11 P. M.
8	...	...	*Sunday.*	3	
9	139.9	...	S. & S. W.	1½	Cloudless till 2 P. M., cloudy afterwards.
10	125.0	0.18	S. & N. E. & E.	5	Scatd. ⌞i; also drizzling & thundering at 3 P. M.
11	128.4	...	N. E. & E. & S. E.	2	Overcast till 3 A. M. Scatd. ⌞i & ⌒i till 3 P. M. cloudy afterwards, also thundering & lightning from 7 to 11 P. M. & drizzling at 7 P. M.
12	127.0	...	W. & S.	¼	Cloudless till 7 A. M. Scatd. ⌞i & ⌒i till 5 P. M. cloudless afterwards, also lightning and drizzling at midnight.
13	140.0	...	S. & S. W.	4½	Cloudless till 3 A. M. Scatd. ╲i till 11 A. M. Scatd. ⌒i till 3 P. M. cloudy till 8 P. M. cloudless afterwards; also drizzling & thundering at 6 P. M.
14	132.0	...	S.	½	Cloudless till 2 A. M. Scatd. ⌞i till 9 A. M. cloudless till 1 P. M. Scatd. clouds afterwards.
15	...	0.86	*Sunday.*	21¾	
16	130.0	...	S. E. & S. W. & S.	0	Scatd. clouds; also thundering and lightning at 8 & 9 P. M.

╲i Cirri, ⌞i Cirro strati, ⌒i Cumuli, ⌒i Cumulo strati, ⌞i Nimbi, —i Strati, ╲i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	°	Inches.		lbs	
17	124.0	2.60	S.	15	Cloudless till 5 A. M. Scatd. clouds till 1 P. M. cloudy afterwards; also thundering and lightning from 5 to 11 P. M. and raining at 3 P. M. and from 7 to 11 P. M.
18	120.0	0.72	S. E. & N. E.	$\frac{1}{4}$	Cloudy till 3 A. M. Scatd. \-i till noon, cloudy afterwards also raining at midnight and 1 A. M. & at 3, 4 and 11 P. M.
19	119.4	0.48	S. E. & S. & S. W.	9	Scatd. \-i & ^i till 3 P. M. cloudy afterwards, also raining at midnight and at 5 & 6 P. M.
20	119.0	...	S. & S. W.	$5\frac{1}{4}$	Cloudless till noon, Scatd. \-i and ^i till 6 P. M. cloudy afterwards, also thundering & lightning at 7 P. M.
21	136.0	...	S. & S. W.	2	Cloudless till 5 A. M. Scatd. \-i till 10 A. M. cloudless till 2 P. M. Scatd. clouds afterwards.
22	...	0.28	*Sunday.*	9	
23	144.0	...	S.	0	Cloudless.
24	144.4	...	S. & S. W.	1	Cloudless.
25	132.0	...	S.	$5\frac{1}{2}$	Cloudless till 3 A. M. Scatd. clouds till 3 P. M. cloudy afterwards also slightly drizzling at 5 P. M.
26	...	0.18	S. E. & S. & E.	25	Cloudy; also drizzling occasionally from 1 to 9 P. M. & lightning from 7 to 9 P. M.
27	133.3	...	S.	0	Scatd. \-i till 3 A. M. cloudy till noon Scatd. \-i afterwards.
28	118.0	1.36	S. & S. E.	$4\frac{3}{4}$	Cloudy; also raining constantly, from 11 A. M. to 11 P. M. & thundering & lightning from 6 to 9 P. M.
29	...	0.14	*Sunday.*	$1\frac{1}{2}$	
30	...	3.10	S. & E.	3	Cloudy; also raining and thundering from 9 A. M. to 2 P. M.
31	...	...	S. E &. S.	$\frac{1}{4}$	Cloudy; also drizzling at 10 A. M. & at 5 & 6 P. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Monthly Results.

		Inches
Mean height of the Barometer for the month, ..	.. ..	29.729
Max. height of the Barometer occurred at 10 A. M. on the 18th,	..	29.947
Min. height of the Barometer occurred at 5 P. M. on the 24th,	..	29.500
Extreme range of the Barometer during the month,	.. ..	0.447
Mean of the Daily Max. Pressures,..	.. .. ..	29.798
Ditto ditto Min. ditto, ..	.. .. ..	29.655
Mean daily range of the Barometer during the month,	.. ..	0.143

		o
Mean Dry Bulb Thermometer for the month, ..	.. ..	84.6
Max. Temperature occurred at 4 P. M. on the 24th,	.. ..	104.2
Min. Temperature occurred at 8 P. M. on the 17th,	.. ..	73.0
Extreme range of the Temperature during the month,	.. ..	31.2
Mean of the daily Max. Temperature,	.. .. ..	95.2
Ditto ditto Min. ditto, ..	.. .. ..	77.2
Mean daily range of the Temperature during the month, ..	..	18.0

Mean Wet Bulb Thermometer for the month, ..	.. ..	77.5
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer,	..	7.1
Computed Mean Dew-point for the month,	.. .. ..	72.5
Mean Dry Bulb Thermometer above computed Mean Dew-point,	..	12.1
		Inches
Mean Elastic force of Vapour for the month, ..	.. ..	0.787

		Troy grains
Mean Weight of Vapour for the month,	.. .. ..	8.42
Additional Weight of Vapour required for complete saturation,	..	3.97
Mean degree of humidity for the month, complete saturation being unity,		0.68

		Inches
Rained 18 days, Max. fall of rain during 24 hours,	.. ..	3.10
Total amount of rain during the month,	.. .. ..	10.36
Prevailing direction of the Wind, ..	.. ..	S. & S. E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of May, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	1				4		2	1	17	1			1	1			1		
1	1		1		6		6	1	12										
2	1		1		6		5		12										1
3	1		1		3		10		9										2
4	1		1		2		8		9						1				4
5	2				2		5		13		2				1				1
6	1		1		4	1	4		13		2		1						
7			2		3		5		14		1		1						
8			1		1		3		18		3								
9			2				2		15		6		1	1					
10					1		1		15	1	6	1	2		1				
11			2	1	1		3		13	1	6		1						
Noon.			1				4	1	13		6		2						
1			2		2		1	1	15	1	4		1		1	1			
2			2		2				16	2	4	1	1		1	1			
3			2	2			2		16	1	5		1						
4	1		1	1	1		2		15		5		1						
5	1		2				5	2	12	1	6								
6	1				3	2	5	1	9		6	1			1	1	1		
7	2	1			2	1	5	3	11		4						1		1
8					3		6	3	10		5						2		
9	1	1			2		6	2	13	1	3		1						
10					1	1	6	2	14	1	2		1						2
11					1		5	2	17	3	2		1						

On the 26th May, the wind which had been blowing steadily from S., and by E. suddenly veered round at 12*h*. 30*m*. to N. W. blowing very strongly, and in heavy gusts varying in pressure from 3 to 25lbs per square foot till 2*h*. 15*m*. P. M. when it became calm, having veered during the interval by W. to S. W. About 3*h*. 30*m*. the wind again changed suddenly from S. W. to N. and by E. and subsequently to E. and by N. The gale was accompanied by a good deal of thunder and lightning and a little rain. The ten minutes observations taken during the gale show that at Noon the Barometer stood at 29.79 Inches at 12*h*. 30*m*., the moment of the first sudden change of wind, and commencement of gale, it rose to 29.83 Inches and then fell gradually and continuously to 29.738 Inches at 5 P. M. At 8 P. M. it again rose to 29.832 Inches.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.574	29.633	29.493	0.140	85.2	91.9	79.4	12.5
2	.507	.563	.447	.116	85.9	93.0	78.4	14.6
3	.511	.555	.455	.100	86 7	95.0	79.2	15.8
4	.539	.601	.465	.136	88.4	97.4	80.6	16.8
5	*Sunday.*							
6	.584	.641	.493	.148	88.3	94 6	82.8	11.8
7	.588	.650	.525	.125	85.8	94.4	82 8	11.6
8	.578	.628	.512	.116	87.8	94.6	81.8	12.8
9	.559	.614	.480	.134	87.9	96.6	76.6	20.0
10	.558	.628	.471	.157	85.8	93.6	78.0	15.6
11	.547	.603	.488	.115	80.5	86.2	77.6	8.6
12	*Sunday.*							
13	.531	.605	.448	.157	87.0	96.4	82.0	14.4
14	.587	.630	.540	.090	84.5	90.2	80.8	9.4
15	.580	.627	.538	.089	83.5	88.8	80.0	8.8
16	.541	.596	.488	.108	84.1	90.6	78.0	12.6
17	.487	.552	.429	.123	86.1	94.2	79.8	14.4
18	.535	.593	.482	.111	85.8	89.0	81.4	7.6
19	*Sunday.*							
20	.617	.672	.517	.155	84.9	92.2	76.0	16.2
21	.580	.630	.523	.107	95.9	92.8	78.0	14.8
22	.546	.592	.473	.119	88.6	95.8	83.8	12.0
23	.524	.554	.468	.086	89.5	96.2	84.2	12.0
24	.548	.577	.506	.071	85.5	93.4	80.8	12.6
25	.535	.572	.484	.088	86.7	94.4	79.6	14.8
26	*Sunday.*							
27	.565	.611	.512	.099	86.8	92.6	83.6	9.0
28	.523	.569	.470	.099	81.4	83.6	80.0	3.6
29	.514	.576	.473	.103	79.3	82.8	76.8	6.0
30	.495	.536	.447	.089	81.1	85.8	75.0	10.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	79.9	5.3	76.2	9.0	0.887	9.49	3.12	0 75
2	80.2	5.7	76.2	9.7	.887	.47	.40	.74
3	81.3	5.4	78.1	8.6	.943	10.04	.14	.76
4	83.2	5.2	80.1	8.3	1.005	.67	.17	.77
5	*Sunday.*							
6	81.9	6.4	78.1	10.2	0.943	.02	.78	.73
7	80.4	5.4	76.6	9.2	.899	9.59	.24	.75
8	81.9	5.9	78.4	9.4	.952	10.12	.48	.74
9	81.6	6.3	77.8	10.1	.934	9.93	.71	.73
10	80.4	5.4	76.6	9.2	.899	.59	.24	.75
11	76.4	4.1	73.5	7.0	.814	8.78	2.20	.80
12	*Sunday.*							
13	81.5	5.5	78.2	8.8	.946	10.07	3.22	.76
14	80.2	4.3	77.2	7.3	.916	9.81	2.54	.79
15	79.2	4.3	76.2	7 3	.887	.52	.48	.79
16	79.6	4.5	76.4	7.7	.893	.56	.65	.78
17	81.2	4.9	77 8	8.3	.934	.97	.98	.77
18	81.5	4.3	78.5	7.3	.955	10.21	.62	.80
19	*Sunday.*							
20	80.8	4.1	77.9	7.0	.937	.02	.47	.80
21	81.9	4.0	79.1	6.8	.973	.38	.49	.81
22	83.8	4.8	80.9	7.7	1.030	.92	3.00	.78
23	84.4	5.1	81.3	8.2	.043	11.06	.23	.77
24	81.1	4.4	78.0	7.5	0.940	10.03	2.69	.79
25	81.0	5.7	77.6	9.1	.928	9.89	3.29	.75
26	*Sunday.*							
27	82.2	4.6	79.4	7.4	.983	10.47	2.74	.79
28	78.8	2.6	77.0	4.4	.910	9.81	1 46	.87
29	76.8	2.5	75.0	4.3	.854	.24	.35	.87
30	78.6	2.5	76.8	4.3	.905	.75	.42	.87

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.561	29.641	29.498	0.143	82.6	86.0	77.0	9.0
1	.552	.628	.476	.152	82.2	85.4	77.0	8.4
2	.544	.623	.464	.159	82.0	85.0	75.0	10.0
3	.536	.614	.469	.145	81.5	84.6	76.0	8.6
4	.539	.601	.455	.146	81.5	85.0	76.0	9.0
5	.544	.600	.478	.122	81.4	84.6	76.4	8.2
6	.560	.637	.498	.139	81.7	84.8	77.0	7.8
7	.572	.657	.515	.142	82.5	86.6	77.8	8.8
8	.585	.672	.530	.142	84.4	88.5	78.2	10.3
9	.591	.671	.525	.146	86.6	90.8	77.2	13.6
10	.590	.668	.519	.149	88.0	92.8	77.8	15.0
11	.581	.644	.516	.128	89.2	94.6	78.0	16.6
Noon.	.564	.626	.502	.124	90.2	95.8	79.6	16.2
1	.546	.606	.473	.133	90.7	96.6	79.2	17.4
2	.528	.579	.464	.115	91.0	97.4	78.6	18.8
3	.510	.569	.434	.135	90.4	96.2	80.0	16.2
4	.495	.552	.429	.123	89.7	95.2	81.0	14.2
5	.493	.572	.445	.127	88.8	94.0	81.4	12.6
6	.501	.639	.447	.192	87.4	92.3	81.4	10.9
7	.518	.612	.445	.167	85.5	89.7	76.0	13.7
8	.541	.618	.465	.153	84.5	88.4	76.8	11.6
9	.559	.634	.486	.148	83.6	87.5	78.0	9.5
10	.574	.628	.511	.117	82.8	86.8	77.0	9.8
11	.468	.614	.510	.104	82.1	86.0	76.6	9.4

The Mean Height of the Barometer, as likewise e Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	79.6	3.0	77.5	5.1	0.925	9.94	1.74	0.85
1	79.1	3.1	76.9	5.3	.908	.76	.78	.85
2	78.9	3.1	76 7	5.3	.902	.70	.77	.85
3	78.6	2.9	76.6	4.9	.899	.67	.64	.86
4	78,8	2.7	76.9	4.6	.908	.76	.55	.86
5	78.7	2.7	76.8	4.6	.905	.73	.54	.86
6	78.9	2.8	76.9	4.8	.908	.76	.61	.86
7	79.5	3.0	77.4	5.1	.922	.91	.73	.85
8	80.5	3.9	77.8	6.6	.934	.99	2.32	.81
9	81.6	5 0	78.6	8.0	.958	10.21	.93	.78
10	82.5	5.5	79.2	8.8	.976	.37	3.31	.76
11	82.3	6.0	79.6	9.6	.989	.48	.68	.74
Noon.	83.3	6.9	79.2	11.0	.976	.33	4.26	.71
1	83.2	7.5	78.7	12.0	.961	.16	.64	.69
2	83.0	8.0	78.2	12.8	.946	9.98	.95	.67
3	82.7	7.7	78.1	12.3	.943	.97	.70	.68
4	82.5	7.2	78.2	11.5	.946	10.00	.37	.70
5	82.1	6.7	78.1	10.7	.943	.00	.00	.71
6	81.7	5.7	78.3	9.1	.949	.09	3.36	.75
7	80.7	4.8	77.3	8.2	.919	9.82	2.90	.77
8	80.3	4.2	77.4	7.1	.922	.87	.48	.80
9	79.7	3.9	77.0	6.6	.910	.75	.28	.81
10	79.4	3.4	77.0	5.8	.910	.77	1.98	.83
11	78.9	3.2	76.7	5.4	.902	.70	.81	.84

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches		lbs	
1	130.0	...	S. & Calm.	0	Scatd. clouds.
2	144.0	0.20	S.	0	Cloudless till 7 A. M.; Scatd. clouds till 8 P. M. cloudy and lightning afterwards also raining at 11 P. M.
3	136.0	0.11	S. & S. W.	½	Cloudy till 10 A. M. Scatd. ╰i till 3 P. M. cloudy afterwards; also lightning at 8 P. M. and raining between 6 & 7 A. M.
4	133.0	...	S.	4	Scatd. ∖i and ╰i till 4 P. M. cloudy afterwards also lightning at 8 & 9 P. M. and drizzling at 11 P. M.
5	...	...	*Sunday.*	1	
6	135.0	...	S.	1	Scatd. ∖i & ╰i till 7 P. M. clouldless afterwards.
7	121.0	...	S. & S. E.	1	Cloudless till 6 A. M. Scatd. ╰i and ⌒i afterwards.
8	127.2	...	S. & S. W.	¾	Cloudless till 5 A. M. Scatd. clouds till 7 P. M. cloudless afterwards.
9	134.0	0.62	S.	7	Cloudless till 2 A. M. Scatd. ╰i till 7 P. M. overcast afterwards; also raining from 9 to 11 P. M.
10	127.4	2.16	S.	6	Scatd. clouds till 5 A. M. Scatd. ╰i till 7 P. M. cloudy afterwards; also raining at 10 & 11 P. M.
11	...	1.10	S.	1½	Cloudy; also raining from midnight to 2 A. M. and from noon to 2 P. M.
12	...	...	*Sunday.*	¼	
13	138.0	...	S. & S. E.	1¾	Scatd. clouds till 6 A. M. Scatd. ╰i afterwards.
14	...	...	S. E &. S.	¼	Scatd. ╰i & ∖i till 8 A. M. cloudy afterwards.
15	...	...	S. & S. E.	0	Cloudy till 6 P. M. Scatd. ∖i & ╰i afterwards also drizzling at 11 A. M.
16	...	...	S.	½	Cloudy; also slightly drizzling at 5 A. M. & 9 P. M.
17	130.4	...	S. & W.	¾	Cloudy till 8 A. M. Scatd. ⌒i & ╰i till 2 P. M. cloudy afterwards; also drizzling at midnight and 1 A. M.
18	...	...	S. & S. E.	1	Cloudy.
19	...	1.53	*Sunday.*	13½	

∖i Cirri, —i Strati, ⌒i Cumuli, ╰i Cirro strati, ⌒—i Cumulo strati, ∿—i Nimbi, ∿ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
20	126.7	1.56	S.	8	Cloudy till 9 A. M. Scatd. ⌒i till 4 P M. cloudy afterwards; also raining from 7 to 11 P. M. and thundering and lightning at 7 & 8 P. M.
21	118.0	...	S.	$1\frac{1}{4}$	Cloudy also thundering and lightning at 10 & 11 A. M.
22	134.9	...	S. & S. E.	1	Cloudy till 9 A. M. Scatd. clouds afterwards
23	127.0	...	S. & S. E.	$2\frac{1}{4}$	Scatd. ⌞i till 11 A. M. Scatd. ⌒i afterwards.
24	...	...	S. & S. E.	$1\frac{1}{4}$	Cloudy till 7 P. M. cloudless afterwards.
25	132.0	...	S. & S. E.	1	Scatd. ⌞i & ⌒i till 7 P. M. cloudless afterwards also drizzling at 7 P. M.
26	...	...	*Sunday.*	$\frac{3}{4}$	
27	118.5	...	S. & S. E. & calm.	1	Cloudy nearly the whole day; also drizzling at 4 & 5 P. M.
28	...	2.47	W. & S. W. & S. E.	4	Cloudy; also incessantly raining from 8 A. M. to 11 P. M. and thundering at 2 P. M.
29	...	1.92	S. W. & W.	$3\frac{1}{4}$	Cloudy; also raining nearly the whole day.
30	...	7.06	S. & S. E.	8	Cloudy; also raining nearly the whole day and thundering and lightning from 1 to 4 A. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.548
Max. height of the Barometer occurred at 8 A. M. on the 20th, ..	29.672
Min. height of the Barometer occurred at 4 P. M. on the 17th, ..	29.429
Extreme range of the Barometer during the month, ...	0.243
Mean of the Daily Max. Pressures,..	29.600
Ditto ditto Min. ditto, ...	29.486
Mean daily range of the Barometer during the month, ...	0.114

	o
Mean Dry Bulb Thermometer for the month, ...	85.5
Max. Temperature occurred at 2 P. M. on the 4th, ...	97.4
Min. Temperature occurred at 2 A. M. on the 30th, ...	75.0
Extreme range of the Temperature during the month, ...	22.4
Mean of the daily Max. Temperature, ...	92.2
Ditto ditto Min. ditto, ...	79.9
Mean daily range of the Temperature during the month, ...	12.3

Mean Wet Bulb Thermometer for the month, ...	80.8
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	4.7
Computed Mean Dew-point for the month, ...	77.5
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	8.0
	Inches
Mean Elastic force of Vapour for the month, ...	0.925

	Troy grains
Mean Weight of Vapour for the month, ...	9.88
Additional Weight of Vapour required for complete saturation, ..	2.84
Mean degree of humidity for the month, complete saturation being unity,	0.78

	Inches
Rained 16 days, Max. fall of rain during 24 hours, ...	7.06
Total amount of rain during the month, ...	18.73
Total amount of rain indicated by the gauge attached to the Anemometer during the month, ...	17.93
Prevailing direction of the Wind, ...	S. & S. E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of June, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.					1	1	4		12		3	2					4		2
1							5	1	15	1	2	1			1	1	3		
2							5		15	1	2	1			1	1	2		1
3					1		5	1	11		1	1	2				2		4
4					1		6	1	8		3	1	1				3		4
5	1	1	1		1		7	1	10		3	1					1		2
6					1		8	1	13		3	1	1						
7							6	1	14	1	5	1	1						
8	1	1					2	1	16		6	1	1						
9	1	1					1		17		5	1	1						1
10							3		16		4	1	3	2					
11							4		12	1	6	1	4	1					
Noon.			1				3		10		6		6	2					
1					1		3		12		6		4	2					
2					1	1	5		10		8		2	1					
3					1		5		13		4	1	3	1					
4	1	1					3		18		2	1	1		1				
5							2		20	1	3		1						
6	1						3		20		1	1	1						
7							6	1	17	1	1	1	2	1					
8							6		15		2	1	2	1	1	1			
9			1		1	1	7	2	16	2					1	1			
10			1		2	1	7	2	12	1	1		1		1	1			1
11			1	1	2	1	9	3	12	2	1				1	1			

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elementa dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.491	29.529	29.449	0.080	81.7	86.7	78.6	8.1
2	.499	.551	.455	.096	82.5	86.8	77.0	9.8
3	*Sunday.*							
4	.550	.605	.497	.108	82.4	85.2	81.0	4.2
5	.510	.566	.453	.113	80.0	83.0	76.8	6.2
6	.505	.544	.458	.086	81.6	86.0	77.8	8.2
7	.570	.629	.537	.092	82.5	85.8	79.2	6.6
8	.588	.633	.533	.100	84.1	89.4	80.0	9.4
9	.579	.638	.515	.123	84.2	89.8	79.4	10.4
10	*Sunday.*							
11	.596	.661	.523	.138	82.9	87.8	80.6	7.2
12	.518	.575	.436	.139	85.0	89.6	81.2	8.4
13	.470	.516	.406	.110	83.6	90.2	77.2	13.0
14	.433	.474	.377	.097	84.2	89.2	82.3	6.9
15	.423	.485	.352	.133	84.3	88.8	81.6	7.2
16	.413	.463	.336	.127	84.2	89.4	81.6	7.8
17	*Sunday.*							
18	.397	.441	.346	.095	83.4	87.4	80.8	6.6
19	.439	.525	.397	.128	84.7	91.2	80.6	10.6
20	.412	.476	.328	.148	82.8	86.0	81.0	5.0
21	.362	.421	.313	.108	82.0	85.4	80.0	5.4
22	.480	.543	.394	.149	80.9	83.7	79.4	4.3
23	.522	.568	.468	.100	84.6	88.8	80.6	8.2
24	*Sunday.*							
25	.519	.564	.467	.097	86.2	89.6	82.6	7.0
26	.520	.563	.475	.088	85.4	90.4	81.0	9.4
27	.531	.582	.489	.093	82.9	86.4	80.4	6.0
28	.573	.625	.521	.104	83.7	86.4	81.2	5.2
29	.610	.669	.559	.110	84.8	89.4	82.6	6.8
30	.615	.659	.563	.096	83.3	85.2	79.2	6.0
31	*Sunday.*							

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly Observations made, during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	78.7	3.0	76.6	5.1	0.899	9.67	1.70	0.85
2	79.8	2.7	77.9	4.6	.937	10.06	.58	.86
3	*Sunday.*							
4	79.1	3.3	76.8	5.6	.905	9.71	.90	.84
5	77.4	2.6	75.6	4.4	.871	.40	.41	.87
6	77.8	3.8	75.1	6.5	.857	.21	2.13	.81
7	78.9	3.6	76.4	6.1	.893	.60	.04	.83
8	79.4	4.7	76.1	8.0	.885	.48	.73	.78
9	79.6	4.6	76.4	7.8	.893	.56	.68	.78
10	*Sunday.*							
11	80.0	2.9	78.0	4.9	.940	10.09	1.70	.86
12	81.1	3.9	78.4	6.6	.952	.17	2.36	.81
13	80.4	3.2	78.2	5.4	.946	.15	1.88	.84
14	81.3	2.9	79.3	4.9	.979	.48	.76	.86
15	80.8	3.5	78.3	6 0	.949	.16	2.12	.83
16	80.4	3.8	77.7	6.5	.931	9.96	.28	.81
17	*Sunday.*							
18	80.7	2.7	78.8	4.6	.964	10.34	1.62	.87
19	81.4	3.3	79.1	5.6	.973	.40	2.02	.84
20	80.3	2.5	78.5	4.3	.955	.27	1.48	.87
21	78.8	3.2	76.6	5.4	.899	9.67	.80	.84
22	78.8	2.1	77.3	3.6	.919	.90	.20	.89
23	80.7	3.9	78.0	6.6	.940	10.05	2.34	.81
24	*Sunday.*							
25	80.6	5.6	76.7	9.5	.902	9.60	3.39	.74
26	80.3	5.1	76.7	8.7	.902	.62	.06	.76
27	79.7	3.2	77.5	5.4	.925	.94	1.85	.84
28	80.8	2.9	78.8	4.9	.964	10.34	.73	.86
29	81.0	3.8	78.3	6.5	.949	.14	2.32	.81
30	80.4	2.9	78.4	4.9	.952	.21	1.72	.86
31	*Sunday.*							

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.521	29.636	29.412	0.224	82.1	86.4	78.8	7.6
1	.505	.610	.403	.207	81.9	85.6	78.6	7.0
2	.499	.596	.378	.218	81.4	85.2	77.4	7.8
3	.488	.594	.355	.239	81.2	84.9	77.0	7.9
4	.482	.602	.344	.258	80.7	84.2	77.4	6.8
5	.494	.605	.353	.252	80.7	83.2	76.8	6.4
6	.510	.635	.385	.250	80.6	82.6	77.0	5.6
7	.520	.644	.385	.259	81.2	83.4	77.6	5.8
8	.532	.647	.381	.266	82.5	84.8	77.6	7.2
9	.541	.661	.373	.288	83.8	86.6	79.0	7.6
10	.543	.660	.360	.300	84.7	88.1	80.2	7.9
11	.539	.652	.341	.311	85.4	88.6	80.0	8.6
Noon.	.527	.641	.338	.303	86.3	90.2	80.2	10.0
1	.510	.625	.334	.291	86.5	90.4	79.8	10.6
2	.489	.604	.313	.291	86.1	91.2	80.0	11.2
3	.471	.581	.313	.268	85.8	89.8	80.2	9.6
4	.459	.576	.314	.262	85.8	89.6	80.0	9.6
5	.458	.582	.319	.263	84.9	88.4	80.4	8.0
6	.461	.582	.332	.250	84.4	87.3	80.0	7.3
7	.480	.601	.355	.246	83.5	86.6	80.0	6.6
8	.499	.627	.381	.246	82.9	86.0	80.1	5.9
9	.517	.655	.389	.266	82.7	85.4	80.0	5.4
10	.532	.669	.399	.270	82.6	85.4	80.2	5.2
11	.535	.661	.421	.240	82.3	86.2	79.2	7.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	79.3	2.8	77.3	4.8	0.919	9.88	1.63	0.86
1	79.2	2.7	77.3	4.6	.919	.88	.56	.86
2	78.8	2.6	77.0	4.4	.910	.81	.46	.87
3	78.6	2.6	76.8	4.4	.905	.75	.46	.87
4	78.1	2.6	76.3	4.4	.890	.61	.43	.87
5	78.4	2.3	76.8	3.9	.905	.75	.29	.88
6	78.4	2.2	76.9	3.7	.908	.78	.23	.89
7	78.9	2.3	77.3	3.9	.919	.90	.31	.88
8	79.5	3.0	77.4	5.1	.922	.91	.73	.85
9	80.0	3.8	77.3	6.5	.919	.84	2.26	.81
10	80.3	4.4	77.2	7.5	.916	.79	.63	.79
11	80.8	4.6	77.6	7.8	.928	.91	.77	.78
Noon.	81.3	5.0	77.8	8.5	.934	.95	3.07	.76
1	81.6	4.9	78.7	7.8	.961	10.24	2.86	.78
2	81.4	4.7	78.1	8.0	.943	.06	.89	.78
3	81.3	4.5	78.1	7.7	.943	.06	.77	.78
4	81.1	4.7	77.8	8.0	.934	9.97	.86	.78
5	80.8	4.1	77.9	7.0	.937	10.02	.47	.80
6	80.6	3.8	77.9	6.5	.937	.02	.29	.81
7	80.3	3.2	78.1	5.4	.943	.12	1.88	.84
8	79.9	3.0	77.8	5.1	.934	.03	.76	.85
9	79.7	3.0	77.6	5.1	.928	9.97	.75	.85
10	79.8	2.8	77.8	4.8	.934	10.03	.65	.86
11	79.5	2.8	77.5	4.8	.925	9.94	.64	.86

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches		lbs	
1	...	3.13	S. & S. W.	0	Cloudy: also drizzling from midnight to 5 A. M. & raining between 8 & 9 A. M. & from 5 to 9 P. M.
2	...	0.64	S. & S. W.	$1\frac{3}{4}$	Cloudy: also raining from 2 to 6 A. M. & at 9 A. M.
3	...	...	*Sunday.*	$1\frac{1}{2}$	
4	...	...	S.	1	Cloudy: also drizzling at 2-3 & 5 P. M.
5	...	0.48	S.	4	Cloudy: also thundering and lightning at 4 & 5 A. M. & raining from 4 A. M. to 2 P. M.
6	...	0.15	S. & S. E.	$3\frac{1}{4}$	Cloudless till 7 A. M. cloudy afterwards; also raining between 1 & 2 P. M. & at 6 P. M.
7	...	0.19	S. & S. E.	$1\frac{1}{4}$	Cloudy till 7 P. M. cloudless afterwards; also drizzling at 4 & 6 A. M. & at 2 P. M.
8	123.4	...	S. E & S.	4	Cloudless till 6 A. M. Scatd. ⌣i & ⌒i afterwards, also slightly drizzling between 10 & 11 A. M.
9	128.0	...	S. & S. E.	$2\frac{1}{2}$	Scatd. clouds: also very slightly drizzled at 2 A. M.
10	...	} 0.74	*Sunday.*	$3\frac{1}{4}$	
11	...		S. & S. E.	1	Scatd. ⌒i till 6 A. M. cloudy till 8 P. M. cloudless afterwards; also raining at 9 & 10 A. M. & at 2 & 6 P. M.
12	116.7	...	S.	$2\frac{3}{4}$	Cloudless till 5 A. M. Scatd. clouds afterwards.
13	115.4	0.84	S.	8	Cloudless till 3 A. M. cloudy afterwards; also raining at 5 A. M. & between 1 & 2 P. M.
14	115.0	0.10	S. & S. E.	1	Cloudy; also slightly raining at 1 P. M.
15	...	0.10	E. & S. E.	3	Scatd. clouds till 11 A. M. cloudy afterwards; also drizzling at 1 & 2 P. M. & between 6 & 7 P. M.
16	122.0	0.22	E.	$3\frac{3}{4}$	Cloudy; also raining at 1 P. M.
17	...	0.43	*Sunday.*	$3\frac{3}{4}$	
18	...	1.72	S. E. & N. E.	$1\frac{3}{4}$	Cloudy; also raining after intervals.
19	125.0	...	S. E. & S. & E.	$2\frac{1}{4}$	Cloudy; also drizzling at 3 & 11 A. M. & at 3 P. M. & thundering and lightning at 10 & 11 P. M.

\i Cirri, —i Strati, ⌒i Cumuli, ⌣i Cirro strati, ⌒i Cumulo strati, ⌣i Nimbi, ⌢i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
20	...	0.60	E. & variable.	3¼	Cloudy; also drizzling from 9 A. M. to 3 P. M. & thundering at 2 P. M.
21	...	0.14	E. (high.)	8½	Cloudy; also raining at 2 & 10 A. M. & at 7, 9 & 10 P. M.
22	...	0.61	S. & E.	3½	Cloudy; also raining at 9 & 11 A M. & from 2 to 4 P. M. & at 7 & 8 P. M. & thundering at 3 P. M.
23	117.0	0.16	S. & S. E.	2¾	Scatd. clouds; also raining at 2 P. M.
24	...	...	*Sunday.*	3¼	
25	...	...	W. & S. & S. W.	3	Cloudy; also slightly drizzling at Midnight.
26	120.0	0.98	W. & S.	8¾	Cloudy; also raining between 2 & 3 A. M. & at 7 & 11 P. M. & thundering at 7 P. M.
27	...	0.58	W. & S. W.	2¼	Cloudy; also raining from 6 to 8 A. M. & at 11 A. M. & from 6 to 9 P. M.
28	...	...	S. & W. & S. W.	1¾	Cloudy; also drizzling at 1 & 11 A. M.
29	125.0	...	S. & W.	2¼	Cloudy; also drizzling at 2 A. M. & at 5, 6, 10 & 11 P. M. & thundering at 2 A. M.
30	...	0.22	S. & S. W.	3	Cloudy; also drizzling after intervals.
31	...	1.06	*Sunday.*	4½	

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.505
Max. height of the Barometer occurred at 10 P. M. on the 29th, ..	29.669
Min. height of the Barometer occurred at 2 & 3 P. M. on the 21st, ..	29.313
Extreme range of the Barometer during the month, ...	0.356
Mean of the Daily Max. Pressures,..	29.558
Ditto ditto Min. ditto, ...	29.448
Mean daily range of the Barometer during the month, ...	0.110

	o
Mean Dry Bulb Thermometer for the month, ...	83.4
Max. Temperature occurred at 2 P. M. on the 19th, ...	91.2
Min. Temperature occurred at 5 A. M. on the 5th, ...	76.8
Extreme range of the Temperature during the month, ...	14.4
Mean of the daily Max. Temperature, ...	87.6
Ditto ditto Min. ditto, ...	80.1
Mean daily range of the Temperature during the month, ...	7.5

Mean Wet Bulb Thermometer for the month, ...	79.9
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	3.5
Computed Mean Dew-point for the month, ...	77.4
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	6.0
	Inches
Mean Elastic force of Vapour for the month, ...	0.922

	Troy grains
Mean Weight of Vapour for the month, ...	9.89
Additional Weight of Vapour required for complete saturation, ..	2.07
Mean degree of humidity for the month, complete saturation being unity,	0.83

	Inches
Rained 27 days, Max. fall of rain during 24 hours, ...	3.13
Total amount of rain during the month, ...	13.09
Total amount of rain indicated by the gauge attached to the Aneonometer during the month, ...	13.42
Prevailing direction of the Wind, ... S.	

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of July, 1864.

MONTHLY RESULTS.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	1		1		3		2		11	1	3	1	2	1					3
1			1		4		3		11	1	3	1	4	1					
2			1	1	5	1	4	1	10	2	2		4	2					
3	1		1		4	1	4		8	2	2	1	4	1	1				1
4	1		1		3		3	1	6	1	2	1	5	1					5
5	1		1	1	4		5		7	1	1	1	4	1	1	1			2
6	1		1		3		6	1	8		2	1	4	1	1				
7	1		1	1	4		5		7	1	3		4	1	1				
8	1				5	1	5		7	1	4		3	1	1				
9	1	1			3		6	1	8	4	3	1	5						
10					3	1	5		12	3	2		4	1					
11			1		2		5	3	10	2	4	1	4						
Noon.			1		2		2		11	1	4		5		1	1			
1	1	1			1		3	2	10		3	1	7	1	1				
2					3	1	2		9	4	3		8	4	1	1			
3					3		3	1	11	2	4		4		1	1			
4					3		1	1	15	1	4		2		1				
5					4		4		14	2	3	1	1						
6					4		3	1	15	3	3	1	1						
7					3	1	4		18	5			1	1					
8					3		4		17	2			1	1					1
9					3	1	5		16	1			1	1					1
10					4	1	6		15	1			1						
11					4		6	1	13	2	2	1	1						

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.555	29.603	29.479	0.124	82.9	89.2	78.4	10.8
2	.537	.587	.480	.107	83.6	88.0	80.0	8.0
3	.538	.582	.462	.120	82.0	87.1	78.4	8.7
4	.564	.607	.524	.083	82.0	85.8	79.7	6.1
5	.515	.581	.500	.081	81.8	85.6	80.0	5.6
6	.491	.549	.422	.127	82.8	86.6	80.4	6.2
7	*Sunday.*							
8	.435	.555	.377	.178	80.6	84.4	79.0	5.4
9	.575	.621	.531	.090	80.6	82.0	78.0	4.0
10	.580	.616	.541	.075	81.7	83.9	80.0	3.9
11	.551	.614	.481	.133	84.8	90.0	80.2	9.8
12	.466	.535	.373	.162	83.6	86.2	81.2	5.0
13	.371	.446	.269	.177	81.8	85.8	79.0	6.8
14	*Sunday.*							
15	.688	.748	.640	.108	82.7	87.6	78.6	9.0
16	.665	.729	.599	.130	84.5	89.6	81.0	8.6
17	.656	.705	.611	.094	85.5	90.2	82.0	8.2
18	.671	.719	.617	.102	85.6	88.6	83.7	4.9
19	.674	.725	.617	.108	85.1	88.4	81.8	6.6
20	.709	.771	.637	.134	82.8	86.2	79.6	6.6
21	*Sunday.*							
22	.748	.798	.673	.125	81.7	87.3	77.0	10.3
23	.718	.791	.645	.146	82.5	87.0	78.2	8.8
24	.712	.764	.651	.113	83.4	87.6	79.2	8.4
25	.743	.798	.689	.109	83.4	89.4	79.4	10.0
26	.748	.806	.683	.123	84.1	89.6	80.2	9.4
27	.721	.778	.648	.130	85.1	91.0	81.2	9.8
28	*Sunday.*							
29	.742	.810	.667	.143	85.7	90.4	81.8	8.6
30	.702	.767	.612	.155	86.9	92.2	81.8	10.4
31	.694	.720	.617	.103	81.9	86.6	79.2	7.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	78.9	4.0	76.1	6.8	0.885	9.50	2.29	0.81
2	80.2	3.4	77.8	5.8	.934	10.01	.02	.83
3	79.3	2.7	77.4	4.6	.922	9.91	1.56	.86
4	79.0	3.0	76.9	5.1	.908	.76	.71	.85
5	79.1	2.7	77.2	4.6	.916	.85	.55	.86
6	79.6	3.2	77.4	5.4	.922	.91	.84	.84
7	*Sunday.*							
8	78.1	2.5	76.3	4.3	.890	.61	.40	.87
9	78.7	1.9	77.4	3.2	.922	.95	.06	.90
10	79.6	2.1	78.1	3.6	.943	10.14	.23	.89
11	81.1	3.7	78.5	6.3	.955	.23	2.23	.82
12	81.0	2.6	79.2	4.4	.976	.48	1.55	.87
13	78.8	3.0	76.7	5.1	.902	9.70	.70	.85
14	*Sunday.*							
15	79.6	3.1	77.4	5.3	.922	.91	.81	.85
16	80.4	4.1	77.5	7.0	.925	.90	2.45	.80
17	81.3	4.2	78.4	7.1	.952	10.17	.55	.80
18	81.2	4.4	78.1	7.5	.943	.06	.70	.79
19	81.2	3.9	78.5	6 6	.955	.21	.36	.81
20	79.3	3.5	76 8	6.0	.905	9.71	.04	.83
21	*Sunday.*							
22	78.2	3.5	75.7	6.0	.873	.40	1.97	.83
23	79.0	3.5	76.5	6.0	.896	.63	2.01	.83
24	79.6	3.8	76.9	6.5	.908	.72	.24	.81
25	79.6	3.8	76.9	6.5	.908	.72	.24	.81
26	79.8	4.3	76.8	7.3	.905	.69	.52	.79
27	80.4	4.7	77.1	8.0	.913	.76	.81	.78
28	*Sunday.*							
29	81.0	4.7	77.7	8.0	.931	.94	.86	.78
30	81.8	5.1	78.7	8.2	.961	10.24	3.01	.77
31	78.4	3.5	75.9	6.0	.879	9.46	1.98	.83

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.636	29.773	29.412	0.331	81.7	84.4	77.0	7.4
1	.630	.754	.424	.330	81.5	84.4	77.4	7.0
2	.621	.752	.405	.317	81.1	84.0	77.4	6.6
3	.609	.743	.383	.360	80.8	83.0	77.5	5.5
4	.603	.737	.377	.360	80.6	84.0	77.6	6.4
5	.611	.749	.381	.368	80.5	83.9	77.8	6.1
6	.629	.769	.397	.372	80.5	83.7	77.5	6.2
7	.643	.784	.404	.380	81.1	84.2	78.4	5.8
8	.657	.800	.403	.397	82.4	85.4	79.4	6.0
9	.665	.810	.370	.440	83.7	87.2	79.2	8.0
10	.666	.803	.395	.408	84.8	87.9	78.0	9.9
11	.659	.795	.385	.410	85.6	89.4	78.4	11.0
Noon.	.644	.779	.372	.407	86.0	89.6	80.0	9.6
1	.625	.760	.358	.402	86.6	91.6	81.0	10.6
2	.603	.733	.334	.399	86.6	92.2	81.5	10.7
3	.580	.703	.309	.394	86.7	92.2	81.2	11.0
4	.568	.691	.318	.373	86.1	92.2	81.4	10.8
5	.564	.708	.335	.373	84.9	91.4	81.2	10.2
6	.577	.703	.303	.400	83.8	89.4	80.6	8.8
7	.588	.721	.297	.424	83.3	88.6	80.4	8.2
8	.608	.755	.269	.486	82.9	87.5	79.8	7.7
9	.628	.767	.349	.418	82.6	86.8	78.4	8.4
10	.639	.771	.377	.394	82.3	85.8	79.0	6.8
11	.640	.771	.385	.386	82.1	85.4	79.0	6.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	79.3	2.4	77.6	4.1	0.928	9.99	1.38	0.83
1	79.2	2.3	77.6	3 9	.928	.99	.32	.88
2	78.9	2.2	77.4	3.7	.922	.93	.24	.89
3	78.6	2.2	77.1	3.7	.913	.84	.23	.89
4	78.4	2.2	76.9	3.7	.908	.78	.23	.89
5	78.4	2.1	76.9	3.6	.908	.78	.20	.89
6	78.2	2.3	76.6	3.9	.899	.69	.29	.88
7	78.7	2.4	77.0	4.1	.910	.81	.36	.88
8	79.3	3.1	77.1	5.3	.913	.82	.79	.85
9	79.9	3 8	77.2	6.5	.916	.81	2.26	.81
10	80.2	4.6	77.0	7.8	.910	.73	.73	.78
11	80.6	5.0	77.1	8.5	.913	.74	3.02	.76
Noon.	80.8	5.2	77.2	8.8	.916	.77	.14	.76
1	81.0	5.6	77.6	9.0	.928	.89	.25	.75
2	81.1	5.5	77.8	8.8	.934	.95	.19	.76
3	81.1	5.6	77.7	9.0	.931	.92	.26	.75
4	81.0	5.1	77.4	8.7	.922	.83	.12	.76
5	80.5	4.4	77.4	7.5	.922	.85	2.64	.79
6	80.1	3.7	77.5	6.3	.925	.92	.18	.82
7	80.1	3.2	77.9	5.4	.937	10.06	1.87	.84
8	79.8	3.1	77.6	5.3	.928	9.97	.82	.85
9	79.7	2.9	77.7	4.9	.931	10.00	.68	.86
10	79.6	2.7	77.7	4.6	.931	.00	.58	.86
11	79.5	2.6	77.7	4.4	.931	.02	.49	.87

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches		lbs	
1	130.0	...	S. & S. W.	4	Cloudy till 9 A. M. Scatd. clouds afterwards; also drizzling at midnight & 1 A. M.; & between 3 & 4 P. M.
2	...	0.51	S. W. & S.	$2\frac{3}{4}$	Scatd. clouds till 3 P. M. cloudy afterwards; also drizzling at 3 A. M. & from 6 to 10 P. M.; & thundering at 5 & 6 P. M.
3	...	⎫ 3.60	W. & S. W.	$4\frac{1}{4}$	Cloudy: also drizzling at 6 A. M. 2 & 3 P. M. & raining from 5 to 11 P. M.
4	...	⎭	S. W. & W. & S.	4	Cloudy: also raining from midnight to 6 A. M. & at 2 P. M.
5	...	...	S. W. & S.	3	Cloudless till 5 A. M. cloudy afterwards; also drizzling at 1 & 3 P. M.
6	...	0.16	W. & S.	$2\frac{3}{4}$	Cloudy; also drizzling at 1, 5 & 6 P. M.
7	...	0.20	*Sunday.*	$5\frac{1}{4}$	
8	...	2.10	E. & S. E.	$14\frac{1}{2}$	Cloudy; also constantly raining.
9	...	2.26	S. & E.	3	Cloudy; also raining at 4, 5, 8 & 10 A. M. & between 9 & 10 P. M.
10	...	0.22	S. E & S. W.	3	Cloudy; also raining at 9 A. M. and from noon to 2 P. M. & at 6 P. M.
11	132.4	0.18	W. & N. W.	$2\frac{3}{4}$	Cloudy till 5 A. M. Scatd. ⁀i till 8 P. M. cloudy afterwards; also raining at 3 & 4 A. M. & at 10 P. M.
12	...	0.88	N. & W.	9	Cloudy; also drizzling from 4 A. M. to 6 P. M. & thundering at 4 P. M.
13	...	0.18	E. & N. E. & S. E.	$8\frac{3}{4}$	Cloudy; also drizzling after intervals.
14	...	2.62	*Sunday.*	7	
15	1150.	0.10	S. & E.	$4\frac{3}{4}$	Cloudy till 5 A. M.; Scatd. ╲_i & ⁀i afterwards; also raining at 4 A. M. and at 2 P. M.
16	118.0	...	S.	$3\frac{1}{4}$	Scatd. ╲_i & ⁀i till 4 A. M.; Scatd. ╲i & ╲_i till 1 P. M.; cloudy afterwards also thundering at 11 P. M.
17	124.0	...	S. & S. W.	3	Scatd. clouds till 5 P. M.; Scatd. ╲_i afterwards.
18	118.0	...	S. W. & S. & W.	4	Scatd. clouds.
19	...	0.28	S. & S. W.	4	Scatd. ╲_i till 3 A. M. cloudy afterwards; also raining at 5 A. M.
20	...	...	S. & W.	$3\frac{1}{4}$	Cloudy; also drizzling from 3 to 8 P. M.; and thundering at 4 P. M.

╲i Cirri, —i Strati, ⁀i Cumuli, ╲_i Cirro strati, ⁀_i Cumulo strati, ╲⁀_i Nimbi, ╲⁀ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Guage 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
21	...	2.78	*Sunday.*	5	
22	123.0	...	S. W. & S. E. & S.	3	Cloudy till 9 A. M. Scatd. clouds till 7 P. M.; cloudless afterwards; also slightly drizzled at 1 A. M.
23	...	...	S. & variable.	3	Scatd. \—i till 8 A. M.: Scatd. clouds afterwards.
24	122.4	...	S. & W. & E.	3¼	Cloudless till 6 A. M.; Scatd ⌒i till 7 P. M.; cloudless afterwards also drizzling between 11 & noon.
25	126.0	0.15	S. & S. E.	3¼	Scatd. clouds till 7 P. M.; cloudless afterwards; also drizzling at 3 & 4 A. M.
26	136.2	...	S.	3¼	Scatd. \i & \—i till 10 A. M.; Scatd. ⌒i till 7 P. M.; cloudless afterwards.
27	129.0	...	S. & S. E.	3	Cloudless till 8 A. M.; Scatd. clouds till 8 P. M.; cloudless afterwards; also drizzling at 4 & 6 P. M.
28	...	...	*Sunday.*	3¼	
29	133.0	0.18	S. E. & S.	2½	Scatd. \—i & ⌒i till 7 P. M.; cloudless afterwards; also raining at 6 P. M.
30	130.5	...	E. & S. & N.	3	Cloudless till 3 A. M.; Scatd. \—i & ⌒i afterwards.
31	...	0.24	E. & S. E.	5	Scatd. clouds till 11 A. M.; cloudy afterwards; also raining at noon & 1 A. M.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.621
Max. height of the Barometer occurred at 9 A. M. on the 29th, ..	29.810
Min. height of the Barometer occurred at 8 P. M. on the 13th, ..	29.269
Extreme range of the Barometer during the month, ...	0.541
Mean of the Daily Max. Pressures,..	29.679
Ditto ditto Min. ditto, ...	29.557
Mean daily range of the Barometer during the month, ...	0.122

	o
Mean Dry Bulb Thermometer for the month, ...	83.3
Max. Temperature occurred at 2, 3 & 4 P. M. on the 30th,.. ..	92.2
Min. Temperature occurred at Midnight on the 22nd, ...	77.0
Extreme range of the Temperature during the month, ...	15.2
Mean of the daily Max. Temperature, ...	87.6
Ditto ditto Min. ditto, ...	80.0
Mean daily range of the Temperature during the month, ...	7.6

Mean Wet Bulb Thermometer for the month, ...	79.8
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	3.5
Computed Mean Dew-point for the month, ...	77.3
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	6.0
	Inches
Mean Elastic force of Vapour for the month, ...	0.919

	Troy grains
Mean Weight of Vapour for the month, ...	9.86
Additional Weight of Vapour required for complete saturation, ..	2.07
Mean degree of humidity for the month, complete saturation being unity,	0.83

	Inches
Rained 24 days, Max. fall of rain during 24 hours, ...	3.60
Total amount of rain during the month, ...	16.64
Total amount of rain indicated by the gauge attached to the Aneomometer during the month, ...	17.35
Prevailing direction of the Wind, ...	S. & S. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of August, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.					3		3		14	1	2		4	1					1
1					3	1	3		14	2	3		4	1					
2					3	1	4		12		3		3	1			1		1
3					3		4	1	11	1	2		4	1			1		2
4					4	1	3		8	1	4	1	3	1					5
5			1		3		3		9	1	4		6	2	1				
6			2		3	1	4		8		4		4	2	1	1			1
7	1		2		2	1	6		7		3		4		2	1			
8	1		1		2		5	1	4		8		3		3	1			
9	3	2	2	1	3		2		3		8	1	5		1				
10	2	1	2		3	2	3		4		10		2		1				
11	2	1			3		5		5	1	6		6						
Noon.	2	1	3		2	1	3	1	4		7	1	6						
1	2				4	2	2		7		6	1	6	2					
2	2	1			3	1	2		7	2	8	2	4	1	1				
3	1				7	2	1		6		7	1	4	2	1				
4	1	1			4	1	3	1	8	2	8		2		1				
5	1	1			3	1	4	1	9		3		3	3	2		1		1
6	2	2			1		8	4	9		2		4	3			1		
7	2	1			3	1	5	2	12		2		3	1					
8	2	1			3	1	6	1	12		1		3	1					
9	2	1			3		6		12		1		3	1					
10	1				2		4	1	14	1	3	1	3	2					
11	1				2		4	1	13		4		3	1					

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.678	29.731	29.626	0.105	82.8	88.4	79.8	8.6
2	.675	.729	.614	.115	83.2	87.4	79.8	7.6
3	.663	.715	.608	.107	84.1	89.2	80.8	8.4
4	*Sunday.*							
5	.655	.727	.553	.174	85.9	91.8	81.6	10.2
6	.590	.640	.511	.129	85.7	92.2	81.8	10.4
7	.572	.655	.500	.155	86.3	91.9	82.1	9.8
8	.571	.641	.507	.134	85.6	93.0	82.6	10.4
9	.504	.578	.420	.158	82.7	84.4	80.8	3.6
10	.441	.555	.341	.214	82.0	85.2	79.2	6.0
11	*Sunday.*							
12	.630	.681	.588	.093	83.9	87.3	81.2	6.1
13	.678	.731	.628	.103	85.0	91.2	80.8	10.4
14	.729	.801	.663	.138	84.6	90.8	81.0	9.8
15	.755	.821	.643	.178	85.4	90.6	81.8	8.8
16	.710	.774	.626	.148	83.6	88.0	81.0	7.0
17	.710	.783	.649	.134	81.9	87.0	78.8	8.2
18	*Sunday.*							
19	.665	.749	.576	.173	82.1	88.2	78.4	9.8
20	.605	.663	.527	.136	82.6	85.9	80.0	5.9
21	.614	.663	.576	.087	81.1	85.2	77.9	7.3
22	.634	.683	.588	.095	80.3	82.3	78.2	4.1
23	.677	.729	.610	.119	82.2	87.4	78.4	9.0
24	.746	.808	.694	.114	82.8	86.8	79.4	7.4
25	*Sunday.*							
26	.917	.983	.860	.123	83.3	89.3	79.6	9.7
27	.882	.956	.805	.151	84.4	89.8	80.0	9.8
28	.828	.899	.744	.155	85.8	90.8	81.4	9.4
29	.817	.871	.754	.117	84.8	91.8	81.8	10.0
30	.833	.898	.767	.131	85.8	90.8	81.2	9.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived, from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	79 2	3.6	76.7	6.1	0.902	9.68	2.07	0.82
2	79 6	3.6	77.1	6.1	.913	.80	.09	.82
3	80.4	3.7	77.8	6.3	.934	10.01	.20	.82
4	*Sunday.*							
5	81.3	4.6	78.1	7.8	.943	.06	.81	.78
6	81.4	4.3	78.4	7.3	.952	.17	.63	.80
7	81.4	4.9	78.0	8.3	.940	.03	.99	.77
8	81.4	4.2	78.5	7.1	.955	.21	.55	.80
9	80.4	2.3	78.8	3.9	.964	.36	1.36	.88
10	79.1	2.9	77.1	4.9	.913	9.82	.65	.86
11	*Sunday.*							
12	80.2	3.7	77.6	6.3	.928	.95	2 18	.82
13	80.9	4.1	78 0	7.0	.940	10.05	.48	.80
14	80.1	4.5	76.9	7.7	.908	9.70	.69	.78
15	80.6	4.8	77.2	8.2	.916	.79	.89	.77
16	80.3	3 3	78.0	5.6	.940	10.07	1.96	.84
17	79.2	2.7	77.3	4.6	.919	9.88	.56	.86
18	*Sunday.*							
19	79 4	2.7	77.5	4.6	.925	.94	.57	.86
20	79.9	2.7	78.0	4.6	.940	10.09	.59	.86
21	78.9	2.2	77.4	3.7	.922	9.93	.24	.89
22	78.2	2.1	76.7	3.6	.902	.72	.19	.89
23	78.7	3.5	76.2	6 0	.887	.54	2.00	.83
24	79.2	3.6	76 7	6.1	.902	.68	.07	.82
25	*Sunday.*							
26	79.4	3.9	76 7	6.6	.902	.66	.27	.81
27	80.3	4.1	77.4	7.0	.922	.87	.44	.80
28	81.2	4.6	78.0	7.8	.940	10 03	2.80	.78
29	80.7	4.1	77.8	7.0	.934	9.99	.47	.80
30	80.1	5.7	76.1	9.7	.885	.44	3.39	.74

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.692	29.916	29.446	0.470	81.8	84.4	78.7	5.7
1	.684	.905	.402	.503	81.6	84.2	78.4	5.8
2	.674	.891	.388	.503	81.4	83.8	78.6	5.2
3	.656	.883	.368	.518	81.3	83.6	78.5	5.1
4	.666	.892	.341	.551	81.2	83.1	78.6	4.5
5	.678	.908	.345	.563	80.8	83.2	77.9	5.3
6	.688	.930	.368	.562	80.7	82.6	78.4	4.2
7	.708	.945	.381	.564	81.5	83.8	79.2	4.6
8	.726	.974	.422	.552	83.1	86.2	79.3	6.9
9	.737	.982	.442	.540	84.3	87.2	80.8	6.4
10	.740	.983	.459	.524	85.6	88.8	80.5	8 3
11	.727	.967	.473	.494	86.5	89.8	81.8	8.0
Noon.	.707	.952	.461	.491	87.1	91.4	80.6	10.8
1	.681	.918	.445	.473	87.6	93.0	82.0	11.0
2	.654	.883	.433	.450	87.4	92.2	79.0	13.2
3	.634	.866	.427	.439	86.8	91.9	78.8	13.1
4	.622	.860	.420	.440	86.4	91.6	79.0	12.6
5	.629	.866	.434	.432	85.4	89.5	80.2	9.3
6	.642	.878	.427	.451	84.4	88.0	80 2	7.8
7	.658	.893	.449	.444	83.7	87.2	79.8	7.4
8	.682	.911	.462	.449	83.2	86 2	79.6	6.6
9	.702	.925	.480	.445	82.8	85.3	79.8	5 5
10	.712	.933	.482	.451	82.6	84.8	79.6	5.2
11	.707	.943	.465	.478	82.2	84.4	79.6	4.8

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Midnight.	79.6	2.2	78.1	3.7	0.943	10.14	1.26	0.89
1	79.4	2.2	77.9	3 7	.937	.08	.26	.89
2	79.3	2.1	77.8	3.6	.934	.05	.22	.89
3	79.4	1.9	78.1	3.2	.943	.16	.08	.90
4	79.3	1.9	78.0	3.2	.940	.13	.08	.90
5	78.9	1.9	77.6	3.2	.928	.01	.06	.90
6	78.8	1.9	77.5	3.2	.925	9.98	.06	.90
7	79.2	2.3	77.6	3.9	.928	.99	.32	.88
8	79.8	3 3	77.5	5.6	.925	.92	.94	.84
9	80.2	4 1	77.3	7.0	.919	.84	2.44	.80
10	80.5	5.1	76.9	8.7	.908	.68	3.08	.76
11	80.9	5.6	77.5	9.0	.925	.86	.24	.75
Noon.	81.1	6.0	77.5	9.6	.925	.84	.49	.74
1	81.1	6.5	77.2	10.4	.916	.75	.77	.72
2	81.0	6.4	77.2	10.2	.916	.75	.70	.73
3	80.7	6.1	77.0	9.8	.910	.69	.52	.73
4	80.6	5.8	76.5	9.9	896	.56	.50	.73
5	80.5	4.9	77.1	8.3	.913	.76	2.92	.77
6	80.4	4.0	77.6	6.8	.928	.93	.38	.81
7	80.3	3.4	77.9	5.8	.937	10.04	.03	.83
8	80.1	3.1	77.9	5.3	.937	.06	1.83	.85
9	79.9	2.9	77.9	4.9	.937	.16	.69	.86
10	79.9	2.7	78.0	4.6	.940	.09	.59	.86
11	79.8	2.4	78.1	4.1	.943	.14	.40	.88

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
1	114.0	0.12	E. & S. E. & S.	$5\frac{3}{4}$	Scatd. clouds; also drizzling between 10 & 11 A. M.; at 1 and between 3 & 4 P. M.
2	...	0.12	S. E.	$5\frac{1}{2}$	Scatd. clouds till 7 P. M. cloudless afterwards; also slightly raining at 11 A. M. & between 3 & 4 P. M.
3	126.0	...	S. E. & S.	4	Scatd. clouds till 8 P. M.: cloudless afterwards; also very slightly drizzled at 8 A. M.
4	...	...	*Sunday.*	$2\frac{3}{4}$	
5	135.0	...	S. & S. E.	$3\frac{1}{4}$	Cloudless till 5 A. M.; Scatd. ⌊i & ⌒i afterwards.
6	138.0	...	S. & S. E.	$2\frac{1}{2}$	Scatd. ⌊i & ⌒i till 7 P. M.; cloudless afterwards.
7	139.0	...	S. & S. E.	$3\frac{1}{4}$	Scatd. clouds till 7 A. M.; Scatd. ⌊i & ⌒i till 8 P. M. cloudless afterwards.
8	132.8	0.13	S. & N. W. & N. E.	4	Cloudless till 5 A. M.; Scatd \i till 8 A. M.; Scatd. ⌒i till 1 P. M. cloudy afterwards; also thundering and drizzling at 3 P. M.
9	...	1.79	N. & N. W. & N. E.	3	Cloudless till 5 A. M. cloudy afterwards; also raining occasionally after 9 A. M.
10	...	0.91	S. & N.	$6\frac{1}{4}$	Cloudy till noon Scatd. clouds till 6 P. M.; Scatd. ⌊i afterwards; also raining from midnight to 10 A. M.; and drizzling at 3 P. M.
11	...	0.25	*Sunday.*	3	
12	120.0	...	S. & S. W. & Calm.	$2\frac{1}{2}$	Scatd. clouds till 7 A. M.; cloudy till 3 P. M. Scatd. \i & ⌊i afterwards.
13	137.0	...	S. & S. E.	3	Scatd. ⌊i & ⌒i.
14	144.0	...	S. E. & S.	$4\frac{1}{2}$	Scatd. \i & ⌊i till 10 A. M; Scatd. ⌊i & ⌒i till 6 P. M.; Scatd. \i & ⌊i afterwards.
15	139.0	...	S. E. & S.	$2\frac{3}{4}$	Scatd. ⌊i till 8 A. M.; Scatd. clouds afterwards.
16	...	0.10	S.	3	Scatd. ⌊i & ⌒i till 8 A. M.; cloudy afterwards; also raining between 11 & noon & thundering at 1 P. M.
17	...	0.33	S. & N. E. & S. E.	$2\frac{3}{4}$	Cloudy; also raining from 2 to 5 P. M. and at 10 & 11 P. M. & thundering at 7 A. M & 2 P. M.
18	...	0.82	*Sunday.*	4	

\i Cirri, —i Strati, ⌒i Cumuli, ⌊i Cirro strati, ∼i Cumulo strati, ∿i Nimbi, ∿ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
19	...	0.37	S. E.	3	Cloudy: also raining from 5 to 9 A. M. and between 2 & 3 P. M.
20	...	...	S. & E.	2½	Cloudy; also drizzling at 5 & 6 A. M.
21	...	2.34	N. & N. W.	3¼	Cloudy; also raining from 4 to 6 A. M. & drizzling incessantly from noon to 11 P. M.
22	...	*4.97	S. W. & N.	2¾	Cloudy; also raining nearly the whole day.
23	133.0	0.20	S. W. & W.	3	Cloudy till 10 A. M. Scatd. \-i & ^i afterwards; also raining at 4 A. M. and at 10 & 11 P. M.
24	125.4	...	W.	3	Cloudy till 8 A. M. Scatd. clouds till 7 P. M.; cloudless afterwards.
25	...	...	*Sunday.*	3¼	
26	140.8	...	S. E. & S.	3¼	Cloudless till 4 A. M.; Scatd. clouds afterwards; also slightly drizzled at 4 P. M.
27	133.0	...	S. & W.	3	Cloudless till 7 A. M.; Scatd. ^i till 4 P. M.; cloudless afterwards.
28	144.0	...	W. & S. W.	3	Cloudless till 7 A. M.; Scatd. ^i till 6 P. M.; cloudless afterwards.
29	140.0	0.14	W. & S. & S. E.	3¼	Cloudless till 7 A. M.; Scatd. clouds till 7 P. M.; cloudless afterwards, also raining at noon & 3 P. M.
30	139.8	...	N. W. & E.	2½	Scatd. clouds till 8 A. M.; Scatd. \-i & ^i till 7 P. M.: cloudless afterwards.

* From noon of the 21st to 9 P. M. of the 22nd.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

MONTHLY RESULTS.

	Inches
Mean height of the Barometer for the month, ...	29.684
Max. height of the Barometer occurred at 10 A. M. on the 26th, ..	29.983
Min. height of the Barometer occurred at 4 A. M. on the 10th, ..	29.341
Extreme range of the Barometer during the month, ...	0.642
Mean of the Daily Max. Pressures,..	29.749
Ditto ditto Min. ditto, ...	29.615
Mean daily range of the Barometer during the month, ...	0.134

	o
Mean Dry Bulb Thermometer for the month, ...	83.8
Max. Temperature occurred at 1 P. M. on the 8th, ...	93.0
Min. Temperature occurred at 5 A. M. on the 21st, ...	77.9
Extreme range of the Temperature during the month, ...	15.1
Mean of the daily Max. Temperature, ...	88.7
Ditto ditto Min. ditto, ...	80.4
Mean daily range of the Temperature during the month, ...	8.3

Mean Wet Bulb Thermometer for the month, ...	80.1
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	3.7
Computed Mean Dew-point for the month, ...	77.5
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	6.3
	Inches
Mean Elastic force of Vapour for the month, ...	0.925

	Troy grains
Mean Weight of Vapour for the month, ...	9.92
Additional Weight of Vapour required for complete saturation, ..	2.18
Mean degree of humidity for the month, complete saturation being unity,	0.82

	Inches
Rained 17 days, Max. fall of rain during 24 hours, ...	2.34
Total amount of rain during the month, ...	12.59
Total amount of rain indicated by the gauge attached to the Anemometer during the month, ...	11.54
Prevailing direction of the Wind, ...	S. & S. E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of September, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	2	2			2		7		8		1		3		1		1		1
1	2	2			2		7		8		1		3		2		1		
2	2	2			3		5		8		1		3		2		1		1
3	2	2			4		5		8		1		2		2		1		1
4	1	1	1		3	1	5		7		2	1	2		2		1		2
5	2	2	1	1	3	2	4		7		2		2		2				3
6	2	1			3	1	5	1	9		1	1	5	1	1				
7	2	1	1		3	1	6		9		1	1	2		2				
8			1		1		7	2	7		3		3		4				
9	1		1				6		9	1	2		5	1	2				
10			2	1	2		6		7	1	2	1	6		1				
11	1		1	1	2	1	6		6	1	4		4		2				
Noon.	2	2	1		1		6		7		3	2	6	1					
1	2		1		2		6		3		7	2	4		1				
2	3		3		3	2	7	1	4		5	1	1						
3	2	2	1	1	5	1	4	1	6	1	4	1	2		2				
4	1				1	1	2	1	9	2	7	1	4		2	1			
5	1				1		6		8		3		4		3	2			
6	2	2	1		2		4		10		3		3		1				
7	2	2	1		1		5		10		3	1	3		1				
8	2	1	2		1		5		10		3	1	3						
9	2	2	2		1		6		10		2	1	3						
10	2		1	1			6		10		2	1	3		1				1
11	1		1	1			7		10		2	1	3		2	1			

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.836	29.901	29.776	0.125	84.9	89.8	82.2	7.6
2	*Sunday.*							
3	.809	.866	.715	.121	84.4	90.8	78.2	12.6
4	.797	.866	.734	.132	79.5	83.0	77.0	6.0
5	.450	.719	28.681	1.038	76.3	78.2	74.4	3.8
6	.803	.871	29.712	0.159	80.0	85.2	75.8	9.4
7	.839	.891	.771	.120	81.7	87.8	77.4	10.4
8	.849	.906	.791	.115	82.4	89.4	77.4	12.0
9	*Sunday.*							
10	.859	.906	.807	.099	78.5	81.3	77.4	3.9
11	.874	.939	.813	.126	80.8	86.6	77.0	9.6
12	.862	.915	.794	.121	81.6	86.0	77.4	8.6
13	.863	.919	.811	.108	80.9	85.8	77.0	8.8
14	.912	.966	.851	.115	81.0	86.8	76.4	10.4
15	.931	.991	.884	.107	81.1	86.6	76.0	10.6
16	*Sunday.*							
17	.934	30.000	.890	.110	82.1	87.0	78.0	9.0
18	.946	.007	.893	.114	82.0	87.5	76.0	11.5
19	.923	29.994	.854	.140	82.5	88.3	76.8	11.5
20	.877	.906	.822	.084	80.3	85.2	74.1	11.1
21	.869	.928	.820	.108	71.9	75.2	69.1	6.1
22	.779	.832	.728	.104	74.1	75.8	72.2	3.6
23	*Sunday.*							
24	.810	.872	.768	.104	81.1	88.0	75.0	13.0
25	.859	.926	.799	.127	81.9	90.4	75.0	15.4
26	.936	30.019	.872	.147	81.2	89.8	74.8	15.0
27	.949	.007	.901	.106	80.4	88.2	72.8	15.4
28	.956	.032	.902	.130	79.1	86.5	72.5	14.0
29	.978	.062	.932	.130	78.0	85.0	70.6	14.4
30	*Sunday.*							
31	.983	.057	.935	.122	80.1	86.8	74.2	12.6

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means, are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	80.3	4.6	77.1	7.8	0.913	9.76	2.73	0.78
2	*Sunday.*							
3	78.5	5.9	74.4	10.0	.838	8.97	3.34	.73
4	76.1	3.4	73.7	5.8	.819	.85	1.81	.83
5	74.3	2.0	72.9	3.4	.797	.68	.01	.90
6	75.8	4.2	72.9	7.1	.797	.61	2.20	.80
7	77.4	4.3	74.4	7.3	.838	9.02	.35	.79
8	77.7	4.7	74.4	8.0	.838	.00	.61	.78
9	*Sunday.*							
10	76.3	2.2	74.8	3.7	.849	.19	1.16	.89
11	76.9	3.9	74.2	6.6	.832	8.96	2.11	.81
12	77.0	4.6	73.8	7.8	.822	.84	.50	.78
13	76.2	4.7	72.9	8.0	.797	.59	.51	.77
14	75.8	5.2	72.2	8.8	.781	.40	.74	.75
15	75.3	5.8	71.2	9.9	.756	.13	3.04	.73
16	*Sunday.*							
17	75.7	6.4	71.2	10.9	.756	.12	.39	.71
18	75.4	6.6	70.8	11.2	.746	.02	.45	.70
19	76.2	6.3	71.8	10 7	.771	.26	.38	.71
20	75.4	4.9	72.0	8.3	.776	.36	2.55	.77
21	69.0	2.9	66.7	5.2	.653	7.16	1.32	.84
22	72.0	2.1	70.5	3.6	.739	8.06	.01	.89
23	*Sunday.*							
24	75.4	5.7	71.4	9.7	.761	.18	2.99	.73
25	74.1	7.8	68.6	13.3	.695	7.47	3.97	.65
26	72.4	8.8	66.2	15.0	.642	6.91	4.30	.62
27	72.3	8.1	66.6	13.8	.651	7.01	3.93	.64
28	70.6	8.5	64.6	14.5	.609	6.58	.95	.63
29	70.6	7.4	65.4	12.6	.626	.77	.42	.66
30	*Sunday.*							
31	73.6	6.5	69.0	11.1	.704	7.59	.25	.70

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month. Max.	Min.	Diff.	Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month. Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.874	29.993	29.712	0.281	78.0	83.8	72.2	11.6
1	.865	.981	.694	.287	77.6	83.8	72.4	11.4
2	.853	.971	.656	.315	77.4	83.4	72.6	10.8
3	.848	.971	.641	.330	76.7	83.4	72.2	11.2
4	.846	.972	.616	.356	76.6	83.0	71.6	11 4
5	.857	.987	.605	.382	76.7	82.6	70.6	12.0
6	.874	30.008	.601	.407	76.2	82.4	69.1	13 3
7	.893	.025	.588	.437	77.1	83.8	70.2	13.6
8	.925	.052	.763	.289	79.5	85.7	70.4	15.3
9	.924	.062	.554	.508	81.2	87.4	69.8	17.6
10	.920	.045	.475	.570	82.6	87.4	70.3	17.1
11	.896	.027	.333	.694	83.8	89.0	71.8	17.2
Noon.	.865	29.999	.113	.886	81.3	88.9	72.5	16.4
1	.832	.972	28.850	1.122	81.7	90.0	72.4	17.6
2	.801	.953	.681	.272	84.8	90.8	72.4	18.4
3	.799	.937	.930	.007	85.0	90.4	72.4	18.0
4	.801	.935	29.014	0.921	84.5	90.6	71.6	19.0
5	.842	.941	.753	.188	83.4	88.6	71.4	17.2
6	.840	.954	.539	.415	81.3	86.8	71.4	15.4
7	.861	.962	.544	.418	80.2	84.5	71.4	13.1
8	.882	.977	.622	.355	79 3	82.6	71.4	11.2
9	.894	.993	.686	.307	79.0	82.6	72.0	10.6
10	.897	.989	.716	.273	78.5	82.2	72.2	10.0
11	.890	.979	.719	.260	78.1	82.2	72.2	10.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Midnight.	74.7	3.3	72.4	5.6	0.785	8.50	1.69	0.83
1	74.7	2.9	72.7	4.9	.792	.59	.48	.85
2	74.5	2.9	72.5	4 9	.787	.54	.47	.85
3	74.0	2.7	72.1	4.6	.778	.44	.36	.86
4	74.0	2.6	72.2	4.4	.781	.48	.29	.87
5	74.2	2.5	72.4	4.3	.785	.53	.27	.87
6	73.7	2.5	71.9	4.3	.773	.41	.25	.87
7	74.3	2.8	72.3	4.8	.783	.49	.43	.86
8	74.9	4.6	71.7	7.8	.768	.30	2.36	.78
9	75.2	6.0	71.0	10.2	.751	.09	3.12	.72
10	75.5	7 1	70.5	12.1	.739	7.93	.75	.68
11	75.8	8.0	70.2	13.6	.732	.82	4.28	.65
Noon.	75.7	8.6	69.7	14.6	.720	.69	.59	.63
1	75.5	9.2	69.1	15.6	.706	.53	.89	.61
2	75.6	9.2	69.2	15.6	.708	.56	.90	.61
3	75.6	9.4	69.0	16.0	.704	.51	5.02	.60
4	75.4	9.1	69.0	15.5	704	.51	4.84	.61
5	75.5	7.9	70.0	13.4	.727	.79	.17	.65
6	75.5	5.8	71.4	9.9	.761	8.18	3.06	.73
7	75.4	4.8	72.0	8.2	.776	.36	2.52	.77
8	75.2	4.1	72.3	7.0	.783	.46	.13	.80
9	75.2	3.8	72.5	6.5	.787	.51	1.99	.81
10	75.1	3.4	72.7	5.8	.792	.58	.77	.83
11	74.8	3.3	72.5	5.6	.787	.53	.69	.84

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches.		lbs	
1	134.0	0.12	S. & S. E.	4¼	Cloudless till 5 A. M. Scatd. clouds till 6 P. M. cloudless afterwards, also raining between 1 & 2 P. M.
2	...	...	*Sunday.*	3	
3	144.0	1.57	N. & N. W. & E.	6½	Cloudless till 10 A. M. ⌒i till 5 P. M. cloudy afterwards; also thundering and raining at 7 & 8 P. M.
4	...	0.20	E. & S.	..	Cloudy; also drizzling at noon & 1 P. M. & from 5 to 11 P. M.
5	...	*1.55	E. (vanes broken.)	...	Heavy scud also heavy driving rain. From midnight to 6 P. M. a Cyclone passed over Calcutta.
6	140.0	...	...	...	Cloudy till 6 A. M. └i & ⌒i till 5 P. M. cloudless afterwards.
7	142.8	...	...	...	Cloudless till 4 A. M. └i & ⌒i afterwards.
8	132.5	1.59	...	...	Scatd. clouds till 4 P. M. cloudy afterwards; also raining between 5 & 6 P. M.
9	...	...	*Sunday.*	...	
10	...	0.87	E.	...	Cloudy; also raining after intervals.
11	132.2	...	S. & S. E. & N. E.	...	└i till 3 A. M. Scatd. clouds till 1 P. M. ⌒i till 6 P. M. cloudless afterwards.
12	143.0	...	S. & N. E.	...	Cloudless till 7 A. M. └i & ⌒i afterwards.
13	125.0	...	Variable.	...	Cloudless till 4 A. M. ⌒i afterwards.
14	126.0	...	S. E. & N.	...	\i & └i till 9 A. M. ⌒i afterwards.
15	135.0	...	N.	...	└i till 10 A. M. └i & ⌒i till 6 P. M. cloudless afterwards also slightly foggy from 9 to 11 P. M.
16	...	...	*Sunday.*	...	
17	136.4	...	N.	...	Cloudless till 10 A. M. ⌒i till 4 P. M. cloudless afterwards.
18	146.2	...	N. & S. E.	...	└i till 7 A. M. ⌒i till 4 P. M. cloudless afterwards.
19	145.4	...	N. & S. E. & N. W.	...	\i till 5 A. M. └i till 10 A. M. ⌒i till 5 P. M. \i & └i afterwards.
20	...	0.16	N. W. & E. & S. E.	...	Cloudy; also drizzling from 1 to 11 P. M.
21	...	0.16	N. E. & E.	...	Cloudy; also drizzling nearly the whole day.

* By gauge attached to the Anemometer.

\i Cirri, —i Strati, ⌒i Cumuli, └i Cirro strati, ∼i Cumulo strati, ⌙i Nimbi ⌙ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	M. Pressure of Wind.	General Aspect of the Sky.
	o	Inches		lbs	
22	...	0.28	N. & N. W.	...	Cloudy till 8 P. M. cloudless afterwards also drizzling after intervals till 4 P. M.
23	...	...	*Sunday.*	...	
24	142.5	...	S. W. & S. & W. & N.	...	Cloudless.
25	148.2	...	S. W. & N. W.	...	Cloudless.
26	148.0	...	W. & N. W.	....	Cloudless.
27	144.2	...	N. W. & W. & N.	...	Cloudless.
28	145.0	...	N. & N. W.	...	Cloudless.
29	142.8	...	N. & N. W.	...	Cloudless.
30	...	...	*Sunday.*	...	
31	147.0	...	E. & N.	...	Cloudless till 4 A. M. cloudy till 10 A. M. \-i afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	29.866
Max. height of the Barometer occurred at 9 A. M. on the 29th, ..	30.062
Min. height of the Barometer occurred at 2 P. M. on the 5th, ..	28.681
Extreme range of the Barometer during the month, ...	1.381
Mean of the Daily Max. Pressures, ...	29.935
Ditto ditto Min. ditto, ...	29.780
Mean daily range of the Barometer during the month, ...	0.155

	o
Mean Dry Bulb Thermometer for the month, ...	80.3
Max. Temperature occurred at 2 P. M. on the 3rd, ...	90.8
Min. Temperature occurred at 6 A. M. on the 21st, ...	69.1
Extreme range of the Temperature during the month, ...	21.7
Mean of the daily Max. Temperature, ...	85.8
Ditto ditto Min. ditto, ...	75.6
Mean daily range of the Temperature during the month, ...	10.2

Mean Wet Bulb Thermometer for the month, ...	75.0
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	5.3
Computed Mean Dew-point for the month, ...	71.3
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	9.0
	Inches
Mean Elastic force of Vapour for the month, ...	0.758

	Troy grains
Mean Weight of Vapour for the month, ...	8.18
Additional Weight of Vapour required for complete saturation, ..	2.73
Mean degree of humidity for the month, complete saturation being unity,	0.75

	Inches
Rained 9 days, Max. fall of rain during 24 hours, ...	1.59
Total amount of rain during the month, ...	6.50
Prevailing direction of the Wind, ...	N. & E.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of October, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	5		2	1	3	2	2		3		1		1		4	1	1		1
1	6		2	1	3	1	2		3		1		2		3	1	1		
2	6		2	1	3		2		3		1		2		3		1		
3	6		1		4	1	2		1		1		2		3				4
4	7				4	3	1		3		1		2		3				2
5	6		2	1	2		2		2		2		3		3				1
6	7		2	1	1		4	1	2		2		3		2	1			
7	5		4	1	1		3	1	1		3		4		2	1			
8	7	1	3		2	1	2				2		5						2
9	3		3		4	3	2		4		3		2		2				
10	3	1	4		4	2	2		3		2		2		3				
11	4		1		5	1	2		3		2		2		4				
Noon.	5		1		6	3	2		3		1		2		3				
1	6	1	1	1	5	2	3	1	2				3		3				
2	7		1	1	6	1	2		2				1		3				
3	5		1	1	4	1	3	1	3				2		4				
4	3		1	1	3	1	1		2		2		4	1	5	1	1		
5	5		1	1	5	2	1		3		1		1		4	1	1		1
6	8		2	1	3	1	2		2						4	1	1		
7	9		2	1	3	1	2		3						3	1			
8	8	1	2	1	4	1	2		3						3	1			
9	8		2	1	4	1	2		2						4	1			
10	7		3	1	3		3		2						4	1			
11	7		2	1	4	1	3		2						4	1			

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11. Feet

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day. Max.	Min.	Diff.	Mean Dry Bulb Thermometer.	Range of the Temperature during the day. Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.998	30.063	29.939	0.124	82.4	88.4	78.6	9.8
2	30.009	.076	.956	.120	83.1	89.2	78.0	11.2
3	.041	.107	.980	.127	81.1	86.5	76.8	9.7
4	.044	.102	.984	.118	80.0	85.2	76.8	8.4
5	.044	.119	.985	.134	77.4	83.3	74.2	9.1
6	*Sunday.*							
7	29.975	.050	.886	.164	79.8	85.4	74.4	11.0
8	.978	.049	.927	.122	76.8	80.9	71.8	9.1
9	30.055	.132	30.006	.126	76.7	83.0	72.4	10.6
10	.108	.178	.067	.111	75.3	82.3	71.4	10.9
11	.120	.205	.057	.148	76.0	82.0	71.0	11.0
12	.071	.145	.004	.141	76.1	82.6	71.2	11.4
13	*Sunday.*							
14	.034	.109	29.963	.146	75.0	81.0	70.0	11.0
15	29.996	.068	.930	.138	74.9	81.4	69.8	11.6
16	30.001	.074	.955	.119	74.4	81.5	67.6	13.9
17	.022	.088	.978	.110	74.1	81.2	67.8	13.4
18	.022	.094	.961	.133	74.2	81.6	67.4	14.2
19	.029	.098	.976	.122	75.0	81.4	68.2	13.2
20	*Sunday.*							
21	.022	.104	.959	.145	73.0	80.4	66.4	14.0
22	.030	.104	.984	.120	71.6	80.2	63.9	16.3
23	.036	.124	.980	.144	70.4	78.6	62.6	16.0
24	.015	.087	.959	.128	70.9	79.3	62.8	16.5
25	.008	.088	.955	.133	71.9	79.6	64.8	14.8
26	.018	.077	.973	.104	71.7	80.2	63.9	16.3
27	*Sunday.*							
28	.087	.159	30.035	.124	75.5	83.4	69.8	13.6
29	.070	.144	.004	.140	74.8	82.6	67.4	15.2
30	.039	.110	29.981	.129	73.9	81.0	66.8	14.2

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observation taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	76.8	5.6	72.9	9.5	0.797	8.56	3.05	0.74
2	76.9	6.2	72.6	10.5	.790	.47	.39	.71
3	75.4	5.7	71.4	9.7	.761	.18	2.99	.73
4	75.2	4.8	71.8	8.2	.771	.31	.50	.77
5	73.9	3.5	71.4	6.0	.761	.25	1.76	.82
6	*Sunday.*							
7	74.2	5.6	70.3	9.5	.734	7.92	2.83	.74
8	72.5	4.3	69.5	7.3	.715	.77	.06	.79
9	72.5	4.2	69.6	7.1	.717	.79	.01	.80
10	71.9	3.4	69.5	5.8	.715	.79	1.61	.83
11	71.7	4.3	68.7	7.3	.697	.58	2.02	.79
12	69.8	6.3	65.4	10.7	.626	6.80	.83	.71
13	*Sunday.*							
14	68.1	6.9	63.3	11.7	.584	.35	.96	.68
15	68.4	6.5	63.8	11.1	.593	.46	.82	.70
16	67.2	7.2	62.2	12.2	.563	.14	3.01	.67
17	67.0	7.1	62.0	12.1	.559	.10	2.97	.67
18	67.0	7.2	62.0	12.2	.559	.10	.99	.67
19	66.8	8.2	61.1	13.9	.543	5.91	3.40	.64
20	*Sunday.*							
21	65.4	7.6	59.3	13.7	.511	.58	.18	.64
22	62.9	8.7	55.9	15.7	.456	4.99	.41	.59
23	61.2	9.2	53.8	16.6	.425	.67	.43	.58
24	62.9	8.0	56.5	14.4	.465	5.11	.12	.62
25	65.4	6.5	60.2	11.7	.527	.77	2.71	.68
26	65.5	6.2	60.5	11.2	.532	.84	.59	.69
27	*Sunday.*							
28	68.8	6.7	64.1	11.4	.599	6.52	.91	.69
29	68.1	6.7	63.4	11.4	.586	.39	.87	.69
30	67.8	6.1	63.5	10.4	.588	.42	.59	.71

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	30.032	30.119	29.956	0.163	73.0	80.4	66.6	13.8
1	.024	.113	.932	.181	72.4	80.0	65.8	14.2
2	.016	.106	.932	.174	71.9	79.4	65.3	14.1
3	.009	.082	.933	.149	71.1	79.0	64.8	14.2
4	.007	.098	.927	.171	70.9	78.8	64.2	14.6
5	.025	.122	.937	.185	70.3	78.2	63.0	15.2
6	.041	.149	.956	.193	70.1	78.6	62.6	16.0
7	.064	.156	.977	.179	70.4	79.0	62.7	16.3
8	.087	.170	30.003	.167	73.6	82.6	66.6	16.0
9	.104	.196	.041	.155	76.4	85.4	69.8	15.6
10	.103	.205	.044	.161	78.6	87.0	72.6	14.4
11	.081	.179	.015	.164	80.3	88.1	75.6	12.5
Noon.	.051	.155	29.984	.171	81.0	89.0	77.2	11.8
1	.017	.121	.944	.177	81.5	89.2	76.7	12.5
2	29.993	.081	.919	.162	81.8	88.4	78.6	9.8
3	.980	.067	.899	.168	81.4	87.5	73.6	13.9
4	.978	.068	.886	.182	80.2	87.4	75.6	11.8
5	.988	.076	.899	.177	78.6	85.8	73.8	12.0
6	30.000	.079	.909	.170	77.1	84.4	73.4	11.0
7	.019	.099	.937	.162	75.9	83.4	71.8	11.6
8	.037	.121	.960	.161	75.0	83.0	70.2	12.8
9	.046	.129	.981	.148	74.3	81.6	69.4	12.2
10	.049	.134	.964	.170	73.6	81.1	68.4	12.7
11	.044	.131	.964	.167	73.1	80.9	68.0	12.9

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	68.6	4.1	65.6	7.4	0.630	6.90	1.86	0.79
1	68 9	3.8	65.6	6.8	.630	.90	.70	.80
2	68.3	3.6	65.4	6.5	.626	.85	.63	.81
3	67.4	3.7	64.4	6.7	.605	.65	.63	.80
4	67.3	3.6	64.4	6.5	.605	.65	.58	.81
5	67.0	3.3	64.4	5.9	.605	.66	.42	.82
6	66.7	3.4	64.0	6.1	.597	.57	.46	.82
7	67.0	3.4	64.3	6.1	.603	.64	.46	.82
8	68 5	5.1	64.9	8.7	.615	.73	2.20	.75
9	69.5	6.9	64.7	11.7	.611	.64	3 08	.68
10	70.4	8.2	64.7	13.9	.611	.61	.77	.64
11	70.9	9.4	64.3	16.0	.603	.50	4.41	.60
Noon.	70.9	10.1	63.8	17.2	.593	.39	.75	.57
1	70.9	10.6	63.5	18.0	.588	.31	5.00	.56
2	70 9	10 9	63 3	18.5	.584	.26	.14	.55
3	70.7	10 7	63.2	18 2	.582	.26	.01	.56
4	70.3	9.9	63.4	16.8	586	.31	4.57	.58
5	70.2	8.4	64.3	14.3	.603	.53	3.85	.63
6	70 6	6.5	66.0	11.1	.638	.92	.00	.70
7	70.3	5.6	66.4	9.5	.646	7.03	2.54	.74
8	69.9	5.1	66.3	8.7	.644	.02	.29	.75
9	69.6	4.7	66.3	8.9	.644	.04	.08	.77
10	69.3	4.3	66.3	7.3	.644	.05	1.88	.79
11	68.9	4.2	65.5	7.6	.628	6.87	.92	.78

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
1	147.0	...	S. E. & E. & S.	Scatd. clouds till 2 P. M. cloudy till 7 P. M. cloudless afterwards; also drizzling between 5 & 6 P. M.
2	151.0	...	N. E. & N. & S. E.	\i & \—i till 11 A. M. Scatd. clouds afterwards.
3	146.0	...	N. E.	\—i till 5 A. M. Scatd. clouds afterwards.
4	142.0	0.16	N. E. & S. E. & N.	Cloudy till 8 A. M. Scatd. clouds afterwards; also drizzling at 6 & 7 A. M. & at 1 P. M.
5	...	...	S.	Cloudy: also drizzling at 4 A. M. & 5 P. M.
6	...	...	*Sunday.*	
7	145.0	...	S. W. & S.	Cloudless till 6 A. M. ⌒i till 3 P. M. \—i afterwards.
8	141.4	0.17	S. E. & S.	Scatd. clouds till 8 A. M. ⌒i & \—i afterwards: also raining at 8 A. M. & between noon & 1 P. M.
9	130.0	0.43	S. E. & S.	Cloudless till 8 A. M. ⌒i till 7 P. M. cloudless afterwards, also raining at 11 A. M. & between 5 & 6 P. M.
10	138.0	2.13	E. & S. E. & S.	Cloudless till 4 A. M. \—i till 10 A. M. cloudy till 5 P. M. cloudless afterwards also raining at noon & between 2 & 3 P. M. & slightly foggy at 7 P. M.
11	134.5	...	N. E. & N.	Cloudless till 7 A. M. ⌒i till 5 P. M. \i afterwards: also foggy at 6 & 7 A. M.
12	141.8	...	N. & N. W.	\—i till 10 A. M. ⌒i till 4 P. M. cloudless afterwards, also slightly foggy at 10 & 11 P. M.
13	...	...	*Sunday.*	
14	138.4	...	N. & N. W.	\—i till 8 A. M. ⌒i till 4 P. M. cloudless afterwards.
15	139.0	...	N. W. & N.	\—i till 10 A. M. ⌒i till 5 P. M. cloudless afterwards: also foggy from 9 to 11 P. M.
16	144.4	...	E. & S. E & N. W.	Cloudless.
17	145.0	...	N. & E.	\i & \—i till noon: Scatd. clouds afterwards.
18	141.0	...	N.	Cloudless till 4 A. M. \—i & \i till 5 P. M. cloudless till 9 P. M. \—i afterwards.
19	139.0	...	N.	\—i till noon, cloudless afterwards.
20	...	...	*Sunday.*	
21	139.4	...	N. & N. W.	Cloudless.
22	141.5	...	N.	Cloudless.
23	135.4	...	N.	Cloudless.

\i Cirri, —i Strati, ⌒i Cumuli, \—i Cirro strati, ⌒—i Cumulo strati, \⌒—i Nimbi \⌒ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches		
24	139.2	...	N. & N. W.	Cloudless.
25	138.0	...	N. W. & N. E. & N.	Cloudless.
26	139.0	...	N. & N. E.	Cloudless till noon: └i till 5 P. M. cloudless afterwards, also slightly foggy at 6 A. M. & from 8 to 11 P. M.
27	...	...	*Sunday.*	
28	145.0	...	N. E. & N.	Scatd. clouds till 5 P. M. cloudless afterwards.
29	139.8	...	N. W. & N. E.	Cloudless till 9 A. M. └i & ⌒i till 6 P. M. cloudless afterwards.
30	142.0	...	N. W. & S. W.	Cloudless till 1 P. M.: └i & ⌒i till 6 P. M. cloudless afterwards.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Monthly Results.

	Inches.
Mean height of the Barometer for the month, ...	30.033
Max. height of the Barometer occurred at 10 A. M. on the 11th, ..	30.205
Min. height of the Barometer occurred at 4 P. M. on the 7th, ..	29.886
Extreme range of the Barometer during the month, ...	0.319
Mean of the Daily Max. Pressures,..	30.106
Ditto ditto Min. ditto, ...	29.976
Mean daily range of the Barometer during the month, ...	0.130

---

	o
Mean Dry Bulb Thermometer for the month, ...	75.6
Max. Temperature occurred at 1 P. M. on the 2nd, ...	89.2
Min. Temperature occurred at 6 A. M. on the 23rd, ...	62.6
Extreme range of the Temperature during the month, ...	26.6
Mean of the daily Max. Temperature, ...	82.4
Ditto ditto Min. ditto, ...	69.8
Mean daily range of the Temperature during the month, ...	12.6

Mean Wet Bulb Thermometer for the month, ...	69.3
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.3
Computed Mean Dew-point for the month, ...	64.9
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	10.7
	Inches
Mean Elastic force of Vapour for the month, ...	0.615

	Troy grains
Mean Weight of Vapour for the month, ...	6.70
Additional Weight of Vapour required for complete saturation, ..	2.78
Mean degree of humidity for the month, complete saturation being unity,	0.71

	Inches
Rained 6 days, Max. fall of rain during 24 hours, ...	2.13
Total amount of rain during the month, ...	2.89
Prevailing direction of the Wind, ...	N. & N. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of November, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	7		5		2		2		4		1				3				2
1	9		5		1		3		4		1				3				
2	8		4		2		3		3		1				4				1
3	10		4				3		2						5				2
4	12		1		1		1		3	1					4				4
5	12		4				1		2						3				4
6	12	1	2		2		1		3				1		5				
7	12	1	1		3		4		1						5				
8	7		4		4		3	1	1		2				5				
9	6		6		5		2		1		1				5				
10	10		7		1		3		1		1		1		2				
11	9		6		2		2	1	2		1		1		3				
Noon.	11		3		3	1	4				1		2		2				
1	11	1	2		3		2		2	1	1		1		4				
2	16				1		3		2				1		3				
3	12		5				3	1	1		1				4				
4	12		3		1		4		1		1				4				
5	10		4		2	1	3		2	1	1		1		3				
6	7		5		4	1	2		1	1	2				5				
7	7		5		2		3		1		2				5		1		
8	7		5		2		2		2		2				5		1		
9	7		4		2		3		2		2				5		1		
10	7		5		2		2		2		2				5		1		
11	7		5		2		2		2		2				5		1		

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Latitude 22° 33′ 1″ North. Longitude 88° 20′ 34″ East.

Height of the Cistern of the Standard Barometer above the Sea-level, 18.11 Feet.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	30.008	30.071	29.948	0.123	73.7	80.4	67.4	13.0
2	.002	.080	.941	.139	72.7	79.8	67.4	12.4
3	.053	.127	30.007	.120	70.6	78.6	63.8	14.8
4	*Sunday.*							
5	.061	.134	29.984	.150	70.7	79.8	63.6	16.2
6	.061	.139	30.015	.124	70.3	80.8	61.6	19.2
7	.074	.148	.017	.131	71.0	79.6	64.4	15.2
8	.030	.102	29.979	.123	70.6	79.6	63.6	16.0
9	.025	.083	.967	.116	69.7	79.6	61.4	18.2
10	.000	.082	.930	.152	71.1	81.2	62.0	19.2
11	*Sunday.*							
12	29.991	.069	.932	.137	71.5	79.2	65.0	14.2
13	.989	.084	.926	.158	71.8	79.9	64.6	15.3
14	.983	.071	.928	.143	71.7	79.8	65.0	14.8
15	.953	.033	.898	.135	71.5	79.9	64.2	15.7
16	.996	.068	.938	.130	72.9	82.2	64.4	17.8
17	.988	.063	.928	.135	73.1	82.6	66.4	16.2
18	*Sunday.*							
19	.965	.027	.920	.107	73.0	83.0	64.8	18.2
20	30.001	.076	.921	.155	73.3	82.3	67.2	15.1
21	.022	.115	.964	.151	71.5	79.0	66.2	12.8
22	.025	.111	.976	.135	69.7	78.4	62.6	15.8
23	.058	.125	30.008	.117	68.2	78.2	59.8	18.4
24	.125	.191	.066	.125	70.1	80.2	61.6	18.6
25	*Sunday.*							
26	.110	.191	.060	.131	69.2	79.0	60.2	18.8
27	.090	.173	.031	.142	69.1	78.4	61.2	17.2
28	.095	.169	.052	.117	65.8	74.4	58.2	16.2
29	.101	.167	.064	.103	64.6	74.9	56.2	18.7
30	.098	.177	.050	.127	65.2	75.4	57.2	18.2
31	.081	.155	.051	.104	66.2	75.8	57.4	18.4

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the hourly Observations made during the day.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued).*

Date.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	67.1	6.6	62.5	11.2	0.568	6.21	2.75	0.69
2	66.5	6.2	61.5	11.2	.550	.02	.66	.69
3	62.6	8.0	56.2	14.4	.461	5.06	3.09	.62
4	*Sunday.*							
5	63.7	7.0	58.1	12.6	.491	.39	2.79	.66
6	63.7	6.6	58.4	11.9	.496	.45	.63	.68
7	64.5	6.5	59.3	11.7	.511	.60	.65	.68
8	63.4	7.2	57.6	13.0	.483	.30	.85	.65
9	62.8	6.9	57.3	12.4	.478	.26	.67	.66
10	63.8	7.3	58.0	13.1	.489	.37	.91	.65
11	*Sunday.*							
12	65.1	6.4	60.0	11.5	.523	.73	.65	.68
13	65.5	6.3	60.5	11.3	.532	.84	.61	.69
14	65.9	5.8	61.3	10.4	.546	6.00	.43	.71
15	65.0	6.5	59.8	11.7	.520	5.69	.69	.68
16	66.6	6.3	61.6	11 3	.552	6.03	.70	.69
17	66.4	6.7	61.0	12.1	.541	5.91	.88	.67
18	*Sunday.*							
19	66.4	6.6	61.1	11.9	.543	.93	.83	.68
20	65.8	7.5	59.8	13.5	.520	.67	3.17	.64
21	63.6	7.9	57.3	14.2	.478	.24	.14	.63
22	62.3	7.4	56.4	13.3	.464	.10	2.83	.64
23	60.9	7.3	55.1	13.1	.444	4 91	.67	.65
24	62.5	7.6	56.4	13.7	.464	5.09	.94	.63
25	*Sunday.*							
26	62.2	7.0	56.6	12.6	.467	.14	.67	.66
27	61.7	7.4	55.8	13.3	.455	.02	.76	.65
28	57.9	7.9	51.6	14.2	.394	4.37	.67	.62
29	56.9	7.7	50.7	13.9	.382	.26	.52	.63
30	58.7	6.5	53.5	11.7	.421	.68	.23	.68
31	59.8	6.4	54.7	11.5	.438	.85	.27	.68

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Faht.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	30.026	30.112	29.953	0.159	66.5	70.4	60.0	10.4
1	.024	.103	.943	.160	65.8	69.9	59.4	10.5
2	.016	.103	.938	.165	65.3	69.8	58.6	11.2
3	.004	.086	.940	.146	64.8	69.6	57.9	11.7
4	.009	.098	.934	.164	64.0	68.8	57.4	11.4
5	.023	.105	.940	.165	63.7	68.4	56.6	11.8
6	.039	.122	.949	.173	63.0	68.0	56.2	11.8
7	.062	.146	.974	.172	63.0	67.8	56.4	11.4
8	.088	.171	30.002	.169	66.3	70.4	59.4	11.0
9	.111	.191	.027	.164	70.0	74.1	64.8	9.3
10	.108	.186	.027	.159	73.2	76.4	68.0	8.4
11	.088	.176	.005	.171	75.5	78.0	70.8	7.2
Noon.	.057	.145	29.969	.176	77.3	80.8	72.8	8.0
1	.024	.115	.930	.185	78.4	81.8	74.0	7.8
2	.001	.101	.904	.197	79.3	82.8	74.4	8.4
3	29.989	.096	.898	.198	79.0	83.0	74.4	8.6
4	.985	.094	.901	.193	77.2	81.0	72.2	8.8
5	.993	.095	.906	.189	75.4	79.2	70.4	8.8
6	30.008	.119	.916	.203	73.2	77.0	68.0	9.0
7	.024	.141	.933	.208	71.2	75.1	65.4	9.7
8	.038	.153	.949	.204	69.7	73.2	63.9	9.3
9	.047	.160	.967	.193	68.7	72.4	63.0	9.4
10	.049	.146	.967	.179	67.8	71.6	62.4	9.2
11	.040	.140	.960	.180	66.9	71.2	60.2	11.0

The Mean Height of the Barometer, as likewise the Dry and Wet Bulb Thermometer Means are derived from the Observations made at the several hours during the month.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.—*(Continued.)*

Hour.	Mean Wet Bulb Thermometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a Cubic foot of air.	Additional Weight of Vapour required for complete saturation.	Mean degree of Humidity, complete saturation being unity.
	o	o	o	o	Inches.	Troy grs.	Troy grs.	
Mid-night.	62.6	3.9	59.5	7.0	0.515	5.70	1.49	0.79
1	62.0	3.8	59.0	6.8	.506	.61	.43	.80
2	61.7	3.6	58.8	6.5	.503	.57	.36	.80
3	61.3	3.5	58.5	6.3	.498	.53	.30	.81
4	60.5	3.5	57.3	6.7	.478	.31	.34	.80
5	60.3	3.4	57.2	6.5	.476	.29	.30	.80
6	59.7	3.3	56.7	6.3	.469	.23	.22	.81
7	59.7	3.3	56.7	6.3	.469	.23	.22	.81
8	61.4	4.9	57.5	8.8	.481	.33	.82	.75
9	63.0	7.0	57.4	12.6	.480	.27	2.73	.66
10	64.5	8 7	57.5	15 7	.481	.26	3.56	.60
11	65.2	10.3	58.0	17.5	.489	.31	4.15	.56
Noon.	65.5	11.8	57 2	20.1	.476	.16	.82	.52
1	66.0	12.4	57.3	21.1	.478	.16	5.15	.50
2	66 2	13.1	57.0	22.3	.473	.11	.48	.48
3	65.7	13 3	56.1	22.6	.464	.00	.50	.48
4	65.0	12.2	56.5	20.7	.465	.04	4.91	.51
5	65.4	10.0	58.4	17.0	.496	.39	.04	.57
6	65.6	7.6	59.5	13.7	.515	.62	3.20	.64
7	65.2	6.0	60.4	10.8	.530	.82	2.48	.70
8	64.4	5.3	60.2	9.5	.527	.79	.14	.73
9	63.6	5.1	59.5	9.2	.515	.68	.01	.74
10	63.1	4.7	59.3	8.5	.511	.64	1.84	.75
11	62.7	4.2	59.3	7.6	.511	.65	.63	.78

All the Hygrometrical elements are computed by the Greenwich Constants.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
1	137.4	...	N. W. & N. E.	Cloudless till 5 A. M. \i till 7 P. M. cloudless afterwards also slightly foggy at midnight.
2	137.0	...	N. W.	Cloudless till 5 A. M. Scatd. clouds till 6 P. M. cloudless afterwards also slightly foggy at 8 A. M.
3	140.5	...	N. W. & N.	Cloudless : also slightly foggy at 6 A. M.
4	...	...	*Sunday.*	
5	141.0	...	N.	Cloudless.
6	139.0	...	N.	Cloudless.
7	139.0	...	N.	Cloudless till 5 A. M. ᒪi till 11 A. M. \i till 6 P. M. cloudless afterwards.
8	140.2	...	N. & N. W. & W.	Cloudless.
9	135.9	...	W. & S. & N.	Cloudless : also slightly foggy at 1 A. M. & from 9 to 11 P. M.
10	138.0	...	N. W. & S.	Cloudless also slightly foggy from midnight to 3 A. M. & at 8 & 9 P. M.
11	...	...	*Sunday.*	
12	129.4	...	N. W.	ᒪi till 6 A. M. \i till noon ᒪi & \i till 6 P. M. cloudless afterwards.
13	137.0	...	N. W. & N.	Cloudless : also slightly foggy at 10 & 11 P. M.
14	134.8	...	N. & S. W.	Cloudless, also slightly foggy at midnight & 1 A. M.
15	142.0	...	W. & S. & S. W.	Cloudless : also slightly foggy at 8 & 9 P. M.
16	144.5	...	S. & S. W.	Cloudless.
17	144.0	...	W.	Cloudless.
18	..	...	*Sunday.*	
19	140.0	...	S. W. & S.	Cloudless : also slightly foggy at 6 A. M.
20	141.5	...	W. & N. W. & N.	Cloudless till 2 A. M. ᒪi till 9 A. M. cloudless afterwards.
21	138.4	...	N. W. & N.	ᒪi till 2 P. M. cloudless afterwards also slightly foggy from midnight to 2 A. M.
22	139.0	...	N. & N. W.	Cloudless.
23	139.5	...	N. & E.	Cloudless.
24	141.4	...	N. & N. E. & E.	Cloudless.
25	...	...	*Sunday.*	
26	138.2	...	W. & N.	Cloudless : also slightly foggy at 6 & 7 A. M.
27	146.0	...	N. & N. W.	Cloudless.
28	135.0	...	N. W.	Cloudless till 10 A. M. \i till 7 P. M. cloudless afterwards.
29	131.8	...	N. W. & N.	Cloudless : also slightly foggy at 6 A. M.
30	132.0	...	N. & N. W.	Cloudless.
31	129.6	...	N. W. & N	Cloudless.

\i Cirri, —i Strati, ⌒i Cumuli, ᒪi Cirro strati, ⌒i Cumulo strati, ᒪi Nimbi, ᒪ i Cirro cumuli.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Monthly Results.

	Inches
Mean height of the Barometer for the month, ...	30.036
Max. height of the Barometer occurred at 9 A. M. on the 24th and 26th,	30.191
Min. height of the Barometer occurred at 3 P. M. on the 15th, ..	29.898
Extreme range of the Barometer during the month, ...	0.293
Mean of the Daily Max. Pressures,..	30.112
Ditto ditto Min. ditto, ...	29.982
Mean daily range of the Barometer during the month, ...	0.130

	o
Mean Dry Bulb Thermometer for the month, ...	70.3
Max. Temperature occurred at 3 P. M. on the 19th, ...	83.0
Min. Temperature occurred at 6 A. M. on the 29th, ...	56.2
Extreme range of the Temperature during the month, ...	26.8
Mean of the daily Max. Temperature, ...	79.3
Ditto ditto Min. ditto, ...	62.9
Mean daily range of the Temperature during the month, ...	16.4

Mean Wet Bulb Thermometer for the month, ...	63.4
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	6.9
Computed Mean Dew-point for the month, ...	57.9
Mean Dry Bulb Thermometer above computed Mean Dew-point, ..	12.4
	Inches
Mean Elastic force of Vapour for the month, ...	0.488

	Troy grains
Mean Weight of Vapour for the month, ...	5.36
Additional Weight of Vapour required for complete saturation, ..	2.72
Mean degree of humidity for the month, complete saturation being unity,	0.66

	Inches
Rained No days, Max. fall of rain during 24 hours, ...	Nil.
Total amount of rain during the month, ...	Nil.
Prevailing direction of the Wind, ...	N. & N. W.

Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of December, 1864.

Monthly Results.

Tables showing the number of days on which at a given hour any particular wind blew, together with the number of days on which at the same hour, when any particular wind was blowing, it rained.

Hour.	N.	Rain on.	N. E.	Rain on.	E.	Rain on.	S. E.	Rain on.	S.	Rain on.	S. W.	Rain on.	W.	Rain on.	N. W.	Rain on.	Calm.	Rain on.	Missed.
					No. of days.														
Midnight.	9								4		3		3		6				2
1	9		1						4		3		4		6				
2	9		1						3		3		4		6				1
3	6		1						2		4		5		6				3
4	9				1				2		1		6		7				1
5	8				1				2		2		4		5				5
6	10				1				2		3		4		7				
7	11		1		1		1		1		2		4		6				
8	11		2		1				1		4		2		6				
9	12		1		3		1		1		3		2		4				
10	13		5		1		1		1		2		4						
11	13		5						1		2		4		2				
Noon.	10		2								2		4		9				
1	10		1								1		5		10				
2	9												4		14				
3	9								1				4		13				
4	11										1		3		12				
5	7		2						2		1		3		11				1
6	7		1		1				4		1		4		9				
7	7		1		1				4		1		4		9				
8	8				1				4		1		4		9				
9	8				1				3		2		4		9				
10	8				1				3		2		4		9				
11	7				1				3		2		4		9				1

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of July, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standard.

The tension of aqueous vapour, from which are deduced the pressure of dry air, the dew point and humidity, has been found by the formula $f=f'-\frac{d}{88}\times\frac{h}{30}$ given in Mr. Drew's "Practical Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain gauge is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as $\frac{\text{W S W}}{\text{N N W}}$ or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W. S. W. those in the next higher from N. N. W.; those in the next are apparently becalmed and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

July, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.316	28.232	28.332	27.530	27.480	27.654	75.4	76.3	72.4	72.4	71.0	67.8
2	.299	.230	.305	.553	.474	.597	74.5	73.2	71.1	70.8	71.2	69.2
3	.300	.218	.290	.556	.424	.609	74.0	75.0	72.1	70.7	72.7	68.0
4	.306	.262	.349	.545	.532	.666	74.1	72.0	69.7	71.4	70.1	68.1
5	.321	.248	.333	.572	.482	.648	73.9	74.6	71.1	70.9	71.6	68.2
6	.296	.219	.291	.567	.473	.595	72.1	73.5	70.1	70.1	70.8	68.6
7	.235	.180	.247	.490	.431	.550	71.9	72.5	71.2	70.7	70.9	68.7
8	.243	.164	.259	.511	.400	.545	71.8	73.1	70.9	70.2	71.5	69.4
9	.265	.185	.281	.524	.390	.594	72.9	76.0	71.2	70.6	72.7	68.3
10	.274	.201	.295	.494	.437	.595	73.6	75.1	70.3	72.2	71.5	68.8
11	.306	.219	.325	.567	.459	.615	74.7	74.2	71.0	70.7	71.3	69.2
12	.329	.229	.305	.625	.453	.620	74.1	76.0	69.5	69.0	72.0	68.2
13	.319	.212	.284	.562	.386	.584	75.8	79.1	71.9	71.2	74.0	68.8
14	.326	.247	.319	.607	.507	.624	77.0	75.4	71.1	69.7	70.5	68.6
15	.330	.233	.319	.622	.404	.619	76.7	79.9	72.2	69.2	74.1	68.8
16	.346	.250	.357	.576	.465	.675	74.9	77.9	70.1	71.8	72.4	68.0
17	.339	.254	.344	.574	.489	.636	75.0	75.7	71.8	71.6	71.6	69.2
18	.320	.240	.295	.562	.480	.605	74.0	73.5	70.0	71.3	71.4	68.4
19	.257	.188	.271	.502	.399	.536	73.0	75.2	71.5	71.1	72.5	70.3
20	.254	.186	.262	.481	.395	.548	74.0	76.0	71.9	71.9	72.6	69.4
21	.264	.172	.262	.525	.381	.551	73.1	77.0	72.5	70.5	72.6	69.3
22	.252	.186	.257	.516	.430	.603	73.4	73.9	72.1	70.4	71.2	66.8
23	.252	.175	.247	.515	.411	.542	72.3	73.5	70.8	70.4	71.5	69.0
24	.262	.194	.277	.535	.455	.585	72.6	74.1	72.0	70.0	70.5	68.5
25	.260	.185	.256	.549	.455	.570	73.1	74.6	73.0	69.3	70.1	68.2
26	.284	.211	.284	.562	.494	.618	73.1	75.9	72.2	69.8	69.5	67.3
27	.286	.218	.291	.550	.486	.642	72.7	73.1	71.3	70.4	70.2	66.5
28	.297	.200	.280	.579	.496	.637	73.1	74.4	69.4	69.6	69.0	66.2
29	.314	.230	.308	.596	.429	.637	73.1	75.1	70.8	69.6	73.0	67.6
30	.325	.234	.335	.606	.491	.693	74.0	76.1	72.0	69.6	70.7	66.2
31	.329	.233	.355	.621	.507	.690	75.0	78.7	68.9	69.2	70.0	67.3
	28.294	28.214	28.297	27.554	27.451	27.609	73.8	75.2	71.1	70.5	71.4	68.3

GANGAROOWA NEAR KANDY, CEYLON.

Humidity. A. M. 9.30	Humidity. P. M. 3.30	Humidity. P. M. 10.0	In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain. A. M. 9.30	Rain. P. M. 10.0	Rain. Total.
909	844	862	101.3	67.1	78.2	69.5	8.7	73.9	0	0.280	0.001	0.281
887	938	940	92.0	66.4	76.8	70.4	6.4	73.6	22	0.006	0.663	0.669
900	930	875	0	68.1	77.6	70.0	7.6	73.8	0	0.027	0.444	0.471
917	941	948	87.2	66.7	75.3	69.9	5.4	72.6	0	0.098	0.962	1.060
908	909	909	95.0	66.1	75.0	68.3	6.7	71.7	0	0.018	0.241	0.259
936	916	954	91.9	66.2	75.0	67.5	7.5	71.2	0	0.191	0.302	0.493
963	950	922	84.9	67.9	75.2	69.2	6.0	72.2	0	0.519	0.562	1.081
950	950	954	89.4	67.8	75.0	69.8	5.2	72.4	0	0.293	1.156	1.449
928	901	909	125.7	66.1	76.8	68.5	8.3	72.7	0	0.152	0.043	0.195
956	892	954	0	67.4	75.8	69.3	6.5	72.5	0	0.079	0.036	0.115
879	913	945	117.1	66.5	76.6	69.3	7.3	73.0	0	0.047	0.179	0.226
848	879	958	116.4	65.4	76.8	67.7	9.1	72.2	82	0.004	0.007	0.011
864	848	905	129.6	64.8	80.0	68.8	11.2	74.4	82	0.000	0.000	0.000
790	855	922	134.2	64.1	81.7	68.1	13.6	74.9	147	0.000	0.002	0.002
785	831	896	134.7	65.5	81.0	69.3	11.7	75.2	176	0.000	0.001	0.001
904	838	935	115.2	63.8	78.9	68.9	10.0	73.9	174	0.000	0.210	0.210
896	876	918	109.2	65.5	78.0	68.1	9.9	73.0	0	0.007	0.231	0.238
917	934	949	94.6	66.4	76.5	69.0	7.5	72.8	0	0.050	0.635	0.685
942	917	963	103.4	66.3	76.2	69.1	7.1	72.6	0	0.287	0.225	0.512
934	897	923	102.6	68.4	77.2	69.9	7.3	73.6	0	0.049	0.231	0.280
920	869	901	105.1	68.6	77.2	70.1	7.1	73.6	0	0.088	0.001	0.089
907	917	840	110.6	67.7	76.0	69.8	6.2	72.9	0	0.040	0.044	0.084
941	938	945	86.4	67.2	73.8	69.6	4.2	71.7	0	0.235	0.626	0.861
919	891	892	81.5	66.3	74.7	67.7	7.0	71.2	0	0.393	0.288	0.681
885	866	875	0	67.7	76.4	69.6	6.8	73.0	0	0.034	0.000	0.034
898	815	853	122.6	69.0	76.8	70.9	5.9	73.9	15	0.002	0.000	0.002
928	911	856	103.8	68.2	75.1	70.0	5.1	72.5	25	0.121	0.116	0.237
894	841	902	100.8	65.6	75.2	69.1	6.1	72.2	40	0.000	0.062	0.062
894	934	900	93.9	64.0	76.2	68.5	7.7	72.3	74	0.000	0.099	0.099
869	840	827	122.5	64.8	76.6	67.8	8.8	72.2	0	0.039	0.012	0.051
829	755	947	0	63.3	80.0	68.1	11.9	74.1	40	0.000	0.000	0.000
900	888	912	105.6	66.4	76.8	69.1	7.7	73.0	877	3.059	7.379	10.438

Gangaroowa near Kandy, Ceylon.

July, 1863.	A. M. 9.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	P. M. 3.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0.8	0	0.6	0	0	8.6	10.0	S	0	0.2	0	0	9.5	9.7
2	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
3	0.6	0	0	0	0	9.4	10.0	6.2	0	0.3	0	0	3.5	10.0
4	0.6	0	0.6	0	0	8.5	9.7	0	0	0	0	0	10.0	10.0
5	1.3	0	0	0	0	8.7	10.0	0	0	0.7	0	0	9.0	9.7
6	0	0	0	0	0	10.0	10.0	0.5	0	0.5	0	0	8.0	10.0
7	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
8	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
9	0	0	0.3	0	0	9.7	10.0	0.3	0	4.7	0	0	5.0	10.0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0.4	0	1.0	0	0	8.0	9.4	0	0	0	0	0.3	9.7	10.0
12	9.0	0	0.1	0	0.6	0	9.7	0.7	0	0	0.6	5.0	0	6.3
13	0	0	0	0	0.4	0	0.4	0	4.2	0	0	0	0.8	5.0
14	0	0	0	0	1.0	0	1.0	0	6.6	0	0	0.4	3.0	10.0
15	9.0	0	0	0	0.4	0	9.4	5.0	0	1.0	0.5	0.3	2.2	10.0
16	0.3	0	6.7	0	0	3.0	10.0	0	0	0.1	0	0	9.9	10.0
17	0.2	0	0.2	0	0	9.4	9.8	0.4	0	0	0	0	9.2	9.6
18	0	0	0.6	0	0	8.8	9.4	0	0	0	0	0	10.0	10.0
19	0	0	0.5	0	0	9.2	9.7	0	6.4	0	0	1.6	2.0	10.0
20	1.8	0	0.2	0	0	8.0	10.0	0.5	0	8.5	0	1.0	0	10.0
21	0.1	0	2.8	0	0	7.0	9.9	0.6	0	7.2	0	1.5	0	9.3
22	S	0	0	0	0	9.4	9.4	0	0	1.0	0	0	9.0	10.0
23	0	0	0	0	0	10.0	10.0	0.8	0	0	0	0	9.2	10.0
24	0	0	0	0	0	10.0	10.0	2.8	0	0.7	0	0	6.5	10.0
25	0.4	0	0	0	9.6	0	10.0	0.8	0	0.8	0	8.4	0	10.0
26	0	0	0.6	0	0	9.4	10.0	2.0	0	1.0	0	7.0	0	10.0
27	0	0	0	0	0	9.9	9.9	0	0	0	0	0	10.0	10.0
28	0.8	0	0	0	0	9.2	10.0	0.2	0	0.5	0	0	9.5	10.0
29	0	0	0	0	0	10.0	10.0	0.5	0	7.0	0	0	2.5	10.0
30	0	0	1.0	0	8.5	0	9.5	3.5	0	0.5	0	6.0	0	10.0
31	0	0	0	0	6.7	0	6.7	0.3	0	0	0	0.6	0	0.9
	0.8	0.0	0.5	0.0	0.9	6.9	9.1	0.8	0.6	1.2	0.1	1.1	5.6	9.4

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	6.0	0	4.0	0	10 0	8	0	W by S	W S W	12.67
0	0	0	0	0	10.0	10.0	2	3	W S W	W S W	5.46
0	0	0	0	0	10.0	10.0	2	1	W	W S W	7.66
0	0	S	0	0	10.0	10.0	2	3	W	W S W	3.08
0.5	0	0	0	0	9.5	10.0	2	1	W by S	W S W	6.16
0	0	0	0	0	10.0	10.0	2	2	W S W	W S W	5.98
0	0	0	0	0	10.0	10.0	4	3	W S W	W S W	7.22
0	0	0	0	0	10.0	10.0	2	3	W	W by S	5.90
0	0	0	0	5.0	0	5.0	2	1	W S W	W by S	8.62
0	0	0	0	0	10.0	10.0	4	1	......	......	...
2.5	0	0	0	0	7.5	10.0	4	2	W by S	W S W	9.33
1.4	0	0	0	0.4	0	1.8	1	1	W by S	W S W	3.96
1.8	0	1.8	0	0	0	3.6	0	1	S W	Variable	5.02
0	0	0	0	0	0	0.0	2	2	W	?	2.38
0.1	0	0	0	0.2	0	0.3	2	1	S S W	S S W	7.04
1.0	0	0	0	0	9.0	10.0	0	1	W by S	S W by W	6.95
0	0	0	0	0	6.7	6.7	1	1	W by S	W S W	8.36
0	0	0	0	0	10.0	10.0	2	2	W S W	W by S	6.16
0	0	0	0	0	10.0	10.0	1	1	W by S	W S W	1.85
0	10.0	0	0	0	0	10.0	3	2	W by S	W by S	5.28
0	0	0	0	9.8	0	9.8	1	1	W S W	W S W	3.08
0	0	0	0	10.0	0	10.0	2	2	W N W	W S W	8.80
0	0	0	0	0	10.0	10.0	1	3	W N W	W by S	8.27
0	0	0	0	9.4	0	9.4	3	2	S W by W	W by S	6.16
0	0	0	0	10.0	0	10.0	2	1	W S W	W S W	5.19
0	0	0	0	10.0	0	10.0	0	1	W S W	W S W	10.56
0	0	0	0	9.9	0	9.9	1	2	W S W	W S W	12.32
7.0	0	1.2	0	1.2	0	9.4	1	1	W	W S W	7.83
9.3	0	0.7	0	S	0	10.0	0	1	W	W S W	5.81
0.5	0	0.4	0	8.8	0	9.7	2	1	W	W S W	7.22
8.0	0	0	0	0	S	8.0	1	1	W	W S W	6.60
1.0	0.3	0.3	0.0	2.6	4.3	8.5	1.9	1.5	......	......	6.70

Gangaroowa near Kandy, Ceylon.

July, 1863.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	W	W S W	7.39	W S W	W by S	8.62
2	S S W	W S W	3.87	W	W S W	2.02
3	W S W	W S W	5.98	W	W S W	0.18
4	W by S	W S W	8.00	S W	W S W	3.34
5	W S W	W S W	7.04	S S W	W S W	1.23
6	W	W S W	8.45	W	W S W	7.04
7	W S W	W S W	8.10	W S W	W	9.15
8	W	W by S	9 15	W	W by S	6.16
9	W S W	W by S	7.39	W by S	W by S	7.22
10	......	......	...	W	?	2.55
11	S W	W S W	4.22	W by S	?	0.70
12	W by N	W S W	4.84	W N W	?	0.88
13	W	W S W Calm	5.11	W	None	1.85
14	E	S W	0.35	W S W	None	5.02
15	W by N	W S W Calm	6.69	S S E	?	0.53
16	S W	S W by W	6.16	S W by S	W S W	3.34
17	S W by W	W S W	3.96	S W by W	W S W	3.70
18	W by S	W S W .	7.83	W by S	?	2.82
19	W S W	W S W Calm	8.80	W S W	?	4.49
20	W	W S W Calm & E	4.05	W by S	None	2.20
21	W	W, N N W & Calm	10.65	W	S S W	4.31
22	W .	W by S	7.04	S W by W	W by S	3.52
23	W N W	W by S	10.56	W	W by S	7.39
24	S W	W S W	7.83	S W by W	W by S	8.54
25	W	W by S	14.08	W S W	W by S	9.33
26	S W by W	W by S	10.12	W S W	W by S	5.28
27	W S W	W S W	7.39	W by S	W S W	2.20
28	W	W S W	5.54	W N W	W S W	2.46
29	W S W	W S W	8.10	W by N	None	2.29
30	W	W by S	7.22	W	W S W	1.32
31	S W	W S W	7.48	N by E	None	0.09
	......	......	7.11	......	......	3.86

GANGAROOWA NEAR KANDY, CEYLON.

Distance in Miles in 24 Hours.	Lightning and Thunder.
138.63	
94.85	
83.35	
66.07	
72.31	
82.69	
98.58	
118.46	
116.71	
63.80	
71.73	
47.37	Th. between 5 and 6 o'clock P. M.
49.29	Th. in afternoon, L. and Th. at 6 P. M. and later L. R. to N. E. and E.
46.11	Th. in forenoon and afternoon.
61.07	L. R. to E. between 7 and 8 P. M.
62.38	
68.40	
87.42	
68.84	
84.37	
83.50	
88.41	
104.87	
118.28	
131.69	
136.74	
99.32	
89.88	
65.33	
66.32	
67.94	
84.99	

Gangaroowa near Kandy, Ceylon.

July, 1863.	GENERAL REMARKS.
1	Rain at night, cloudy but fine day.
2	Cloudy fine morn, heavy showers in forenoon.
3	Cloudy fine morn, heavy showers in afternoon.
4	Very damp, heavy showers all day.
5	Damp, showers all day, rather heavy in afternoon.
6	Damp, showers all day, heavy in forenoon.
7	Very damp, showers all day, heavy in morn, fore and after noon.
8	Very damp, showers all day, at times heavy.
9	Mild to warm, pleasant; light showers.
10	Mild to warm, pleasant; light showers.
11	Mild to warm, pleasant; light showers.
12	Mild to warm, pleasant; a little rain at different times.
13	Hot and fine; sultry in afternoon and all even.
14	Hot and fine; a little rain at 3.15 P. M.
15	Hot and fine; cloudy, a little rain in fore even.
16	Mild to very warm, pleasant; showers in afternoon and all even.
17	Mild to warm, damp; showers all day.
18	Mild to warm, damp; showers all day.
19	Mild to warm, damp; showers all day.
20	Mild to warm, damp; showers morn and forenoon.
21	Mild to warm, showery and damp morn; after fine and pleasant.
22	The same; showery and damp till afternoon, then fine and pleasant.
23	Mild to rain and damp; showers all day.
24	Mild to rain and damp; showers all day,
25	Cloudy, but fine and pleasant.
26	Cloudy, but fine and pleasant.
27	Mild to warm and damp; showers all day.
28	Cloudy, but fine and pleasant; shower at noon.
29	Cloudy, mild to warm, damp but pleasant; showery afternoon.
30	Cloudy, mild to warm, pleasant, rain at night and forenoon.
31	Fine hot and dry day.
	Solar Halo on 16th, Lunar Halos on 28th and 29th.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of August, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standard.

The tension of aqueous vapour, from which are deduced the pressure of dry air, the dew point and humidity, has been found by the formula $f = f' - \frac{d}{88} \times \frac{h}{30}$ given in Mr. Drew's "Practical Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain gauge is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W. S. W. those in the next higher from N. N. W.; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M.; "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

GANGAROOWA NEAR KANDY, CEYLON.

August, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.363	28.270	28.376	27.660	27.535	27.714	74.5	77.5	69.5	69.0	70.3	67.1
2	.388	.293	.368	.691	.533	.689	74.7	75.8	71.0	68.7	71.4	67.9
3	.337	.265	.339	.597	.530	.635	75.0	74.5	70.3	70.6	70.3	69.0
4	.341	.250	.323	.642	.537	.691	72.6	75.2	71.4	68.8	69.4	65.7
5	.333	.245	.338	.632	.498	.665	75.0	77.4	72.5	68.9	70.8	67.6
6	.319	.254	.313	.584	.499	.580	74.8	76.0	71.7	70.3	71.2	70.3
7	.310	.230	.335	.561	.446	.638	72.8	75.6	71.9	70.8	72.3	68.7
8	.329	.248	.350	.564	.458	.679	74.0	76.8	71.8	71.6	72.6	67.5
9	.341	.251	.346	.591	.472	.692	73.1	75.1	71.5	71.0	72.1	66.7
10	.335	.247	.326	.610	.508	.714	73.1	74.5	70.2	69.9	70.5	64.8
11	.332	.227	.302	.662	.490	.651	72.5	74.3	71.4	67.5	70.4	66.6
12	.297	.205	.298	.592	.491	.606	73.4	75.0	70.1	69.0	69.5	68.5
13	.301	.228	.340	.575	.467	.671	73.0	73.1	71.0	70.0	71.4	67.5
14	.341	.245	.328	.601	.506	.666	73.0	74.1	72.0	70.6	70.5	67.1
15	.317	.219	.311	.612	.450	.639	73.0	75.0	72.0	69.1	71.7	67.6
16	.313	.226	.307	.560	.471	.591	72.8	73 0	71.0	71.1	71.1	69.5
17	.308	.230	.349	.562	.457	.659	72.1	74.0	70.9	70.8	71.9	68.4
18	.305	.230	.328	.586	.476	.647	73.0	75.1	70.2	69.7	71.1	68.0
19	.325	.213	.324	.599	.394	.629	74.0	78.7	72.0	70.0	73.7	68.6
20	.319	.210	.313	.628	.389	.545	75.0	78.8	73.1	68.4	73.8	71.7
21	.337	.209	.318	.617	.395	.579	74.9	79.8	72.1	69.7	73.5	70.5
22	.305	.203	.304	.599	.397	.540	75.2	79.5	73.5	69.1	73.2	71.5
23	.333	.218	.312	.585	.425	.569	76.6	79.3	73.1	70.9	72.7	70.7
24	.319	.230	.310	.606	.416	.585	76.6	79.8	74.0	69.4	73.5	71.1
25	.318	.233	.314	.603	.421	.520	76.7	79.3	75.0	69.5	73.4	72.7
26	.306	.195	.291	.584	.348	.591	77.0	81.8	71.3	69.8	74.8	68.8
27	.317	.215	.308	.580	.451	.605	77.0	78.2	71.6	70.4	71.5	69.0
28	.313	.198	.295	.581	.434	.633	76.4	76.1	72.0	70.2	71.5	67.1
29	.273	.183	.277	.537	.452	.600	76.1	76.6	70.0	70.4	70.2	67.8
30	.239	.121	.245	.537	.314	.560	75.6	80.9	69.8	68.9	73.2	68.2
31	.253	.158	.271	.542	.374	.601	75.4	77.0	71.9	69.3	72.3	67.5
	28.318	28.224	28.319	27.596	27.453	27.625	74.5	76.7	71.6	69.8	71.8	68.5

Gangaroowa near Kandy, Ceylon.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0								A. M. 9.30	P. M. 10.0	Total.
837	794	925	0	61.0	79.4	65.5	13.9	72.4	203	0.000	0.000	0.000
824	868	906	122.7	65.2	77.0	68.3	8.7	72.7	47	0.000	0.063	0.063
867	875	958	101.0	66.1	76.1	70.0	6.1	73.0	0	0.008	0.190	0.198
884	830	830	112.0	67.0	75.8	68.8	7.0	72.3	0	0.298	0.005	0.303
821	810	854	127.0	64.6	78.3	68.7	9.6	73.5	21	0.000	0.000	0.000
867	856	954	107.0	67.1	77.4	69.9	7.5	73.7	0	0.007	0.060	0.067
937	901	901	89.8	0	75.8	70.2	5.6	73.0	0	0.177	0.060	0.237
925	873	870	96.0	67.5	76.9	69.7	7.2	73.3	0	0.124	0.040	0.164
933	909	856	88.5	65.9	75.8	69.6	6.2	72.7	0	0.088	0.494	0.582
902	879	837	99.1	67.5	75.1	69.4	5.7	72.2	0	0.017	0.014	0.031
850	883	856	96.3	65.2	76.2	68.8	7.4	72.5	0	0.010	0.058	0.068
868	838	949	118.6	65.6	76.7	68.5	8.2	72.6	0	0.079	0.126	0.205
907	947	891	91.5	65.3	75.6	67.6	8.0	71.6	0	0.419	0.390	0.809
924	891	853	108.2	66.3	75.0	68.8	6.2	71.9	0	0.120	0.141	0.261
881	900	866	105.0	67.4	75.9	69.5	6.4	72.7	136	0.000	0.009	0.009
916	942	954	86.9	67.5	74.6	69.3	5.3	72.0	0	0.145	0.876	1.021
959	934	922	93.5	68.4	74.5	69 3	5 2	71.9	0	1.178	0.220	1.398
898	879	931	118.9	64.2	75.8	68.2	7.6	72.0	54	0.000	0.000	0.000
879	852	896	134.0	66.6	78.9	69.0	9.9	73.9	145	0.000	0.000	0.000
809	852	955	134.0	61.8	79.9	66.1	13.8	73.0	350	0.000	0.000	0.000
846	819	950	134.2	64.1	80.3	68.2	12.1	74.3	0	0.007	0.000	0.007
821	818	938	135.8	62.5	81.7	66.8	14.9	74.2	316	0.000	0.000	0.000
832	810	924	134.0	63.9	81.6	68.7	12.9	75.2	271	0.000	0 000	0.000
793	819	912	134.3	63.1	81.1	67.5	13.6	74.3	201	0.000	0.000	0.000
793	829	930	134.5	63.3	82.0	67.8	14.2	74.9	0	0.011	0.000	0.011
794	799	922	138.3	65.4	81.8	68.9	12.9	75.3	0	0.004	0.017	0.021
810	808	918	133.8	63.2	81.8	67.4	14.4	74.6	337	0.000	0.000	0.000
820	864	853	135.1	66.1	81.3	70.2	11.1	75.8	0	0.009	0.034	0.043
831	813	931	0	65.8	78.6	69.3	9.3	73.9	0	0.008	0.009	0.017
806	778	949	140.8	63.0	81.1	67.2	13.9	74.2	242	0.000	0.065	0.065
822	862	866	115.0	0	77.4	68·6	8.8	73.0	0	0.003	0.000	0.003
861	856	905	116.1	65.2	78.0	68.6	9.5	73.3	2323	2.712	2.871	5.583

Gangaroowa near Kandy, Ceylon.

August, 1863.	A. M. 9.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	P. M. 3.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	2.0	0	4.0	0	4.0	0	10.0	1.5	0	0.2	0	7.8	0	9.5
2	0	0	0	0	9.7	0	9.7	0	0	0	0	0	9.5	9.5
3	1.0	0	0.4	0	0	8.5	9.9	0	0	0	0	0	10.0	10.0
4	0	0	8.3	0	0	1.7	10.0	0.3	0	4.4	0	5.3	0	10.0
5	8.0	0	0	0	1.0	0	9.0	1.0	0	0	0	7.0	0	8.0
6	0	0	0.3	0	9.6	0	9.9	0.1	0	0.3	0	8.6	0	9.0
7	0	0	0	0	0	10.0	10.0	0	7.2	S	0	2.5	0	9.7
8	0.3	0	0	0	0	9.7	10.0	S	0	0	0	0	9.3	9.3
9	0.1	0	0	0	0	9.9	10.0	0	0	3.0	0	0	6.0	9.0
10	0.4	0	0.2	0	0	9.3	9.9	1.5	0	0.4	0	0	7.5	9.4
11	0	0	0.5	0	0.5	9.0	10.0	1.0	0	0	0	0	8.5	9.5
12	0.2	0	0	0	0	9.4	9.6	1.5	0	0	0	0	8.5	10.0
13	0.1	0	0.3	0	0	9.6	10.0	0	0	0	0	0	10.0	10.0
14	0.3	0	1.2	0	0	8.5	10.0	4.0	0	0.5	0	0	5.5	10.0
15	0	0	0	0	0	10.0	10.0	2.5	0	0	0	0	7.5	10.0
16	0.1	0	0.2	0	0	9.7	10.0	0	0	0.2	0	0	9.8	10.0
17	0	0	0	0	0	10.0	10.0	0.3	0	0	0	0	9.3	9.6
18	0	0	0.5	0	0	9.5	10.0	1.5	0	6.4	0	2.0	0	9.9
19	0	0	4.7	0	4.7	0	9.4	0	5.0	0.4	0	2.6	0	8.0
20	0.5	0	0	0	S	0	0.5	0	0	0	0	0	0	0
21	9.0	0	0.8	0	0.2	0	10.0	8.8	0	0	0	1.0	0	9.8
22	10.0	0	0	0	0	0	10.0	0	9.3	0	0.4	0.3	0	10.0
23	0.4	0	0	0	4.0	0	4.4	0	6.9	0	0	3.0	0	9.9
24	10.0	0	0	0	S	0	10.0	0	3.5	0.5	0	6.0	0	10.0
25	10.0	0	0	0	S	0	10.0	0.4	7.8	0	0	1.5	0	9.7
26	10.0	0	0	0	S	0	10.0	0	6.0	0	0	0	4.0	10.0
27	0 5	0	0.6	0	3.3	0	4.4	0.6	6.9	0	0	0	2.5	10.0
28	0.4	0	0	0	9.3	0	9.7	0	7.9	0.3	0	0	1.8	10.0
29	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0.2	0	1.5	0	0	0	1.7	0	6.2	0	0.1	0	3.5	9.8
31	0	5.7	2.0	0	2.0	0	9.7	0	0	9.5	0	0.5	0	10.0
	2.1	0.2	0.8	0.0	1.6	4.2	8.9	0.8	2.3	0.9	0.0	1.7	3.9	9.6

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
9.9	0	0	0	0.1	0	10 0	1	0	S W	S W	7.30
0	0	0.1	0	0	9.9	10.0	2	2	W S W	W S W	4.84
0	0	0	0	0	10.0	10.0	2	3	W S W	W S W	7.04
7.0	0	3.0	0	0	0	10.0	1	2	W S W	W S W	5.28
0	0	0	0	9.0	0	9.0	7	1	W S W	S W	12.58
0	0	0	0	0	10.0	10.0	1	2	W S W	W S W	6.16
0	0	0	0	0	10.0	10.0	2	0	S W	W S W	3.87
0	0	0	0	0	9.8	9.8	3	2	W by S	W S W	5.28
4.0	0	0	0	6.0	0	10.0	3	2	W N W	W S W	4.84
0	0	10.0	0	0	0	10.0	2	1	W by S	W S W	10.56
0	0	0	0	0	10.0	10.0	0	1	W S W	W S W	6.69
0	0	0	0	0	10.0	10.0	2	0	W S W	W by S	9.68
0	0	0	0	0	10.0	10.0	3	3	W by S	W by S	8.27
0	0	0	0	0	10.0	10.0	1	1	S W	W by S	7.04
0	0	0	0	0	10.0	10.0	1	2	W by S	W by S	5.90
0	0	0	0	0	10.0	10.0	2	2	W S W	W by S	5.28
0	0	0	0	9.6	0	9.6	3	2	S W by W	W S W	5.72
8.0	0	0	0	2.0	0	10.0	1	1	W S W	W S W	6.78
0	0	0	0	9.0	0	9.0	0	0	W S W	W S W	4.58
0	0	0	0	10.0	0	10.0	1	0	S	None	0.62
8.0	0	0	0	0	0	8.0	2	1	S S W	W S W	4.05
0	3.7	0.3	0	1.0	0	10.0	1	1	W	None	3.52
0	9.2	0	0	0	0	9.2	2	1	W by N	S W	7.83
0	0.2	0	0	0	9.8	10.0	1	1	W	None	2.90
0	0	0	0	10.0	0	10.0	1	0	W by S	None	2.02
0	0	10.0	0	0	0	10.0	1	0	S	None	4.40
3.5	0	3.5	0	S	0	7.0	0	0	S W by W	S S W	5.54
3.0	0	0	0	6.7	0	9.7	2	0	W	W S W	4.58
5.0	0	0	0	5.0	0	10.0	1	1	......	......	...
0	0	0	0	0	10.0	10.0	1	1	W	None	1.85
0	0	10.0	0	S	0	10.0	1	0	S	S S W	4.05
1.6	0.6	1.2	0.0	2.1	4.2	9.7	1.6	1.1	......	......	5.64

Gangaroowa near Kandy, Ceylon.

August, 1863.	3.30 P. M. Direction of wind. Vane.	3.30 P. M. Direction of wind. Lower Clouds.	Velocity in feet per Second.	10.0 P. M. Direction of wind. Vane.	10.0 P. M. Direction of wind. Lower Clouds.	Velocity in feet per Second.
1	W	W S W	6.95	N W by N	S W	3.78
2	S W	W S W	6.34	W	W S W	4.40
3	W	W by S	5.98	W S W	W S W	1.76
4	W S W	W S W	5.63	W N W	None	1.94
5	W	W S W	9.33	W by S	Variable	2.46
6	W	W S W	4.22	S W	?	2.02
7	W S W	S W by W	6.16	W S W	W S W (?)	6.60
8	W by N	W S W	5.46	S W	W S W	0.18
9	W by N	W S W	11.26	W by S	W S W	6.25
10	W	W S W	9.33	W	None	3 34
11	W	W S W	8.98	W by N	W by S	6.16
12	W	W by S	9.77	W by S	W by S	3.34
13	S W by W	W S W	2.11	W S W	W by S	5.28
14	W by N	W	5.81	W S W	W (?)	4.84
15	W	W by S	4.31	W S W	?	0.97
16	W	W S W	3.17	W by S	?	0.79
17	S W	W by S	7.13	W S W	W S W	2.99
18	W by S	S W	8.18	W N W	S S W	0.70
19	W N W	W S W & Calm	5.54	W	?	0.18
20	W	Calm.	1.23	N W by N	Calm ?	2.64
21	W by N	W S W & Calm	5.11	W	None	0.09
22	W by N	W S W & Calm	4.66	W N W	?	2.11
23	W N W	Calm	3.96	N W by W	None	0.26
24	W	N E	5.02	S E	Calm	0.00
25	W	W N W & Calm	0.35	W	W	1.06
26	W N W	Calm	2.29	Calm	None	0.00
27	W by N	S S W	5.54	N W	None	2.82
28	W S W	S W	6.42	W by N	S W	2.29
29	......	......	...	W N W	W S W	0.09
30	W by N	Calm	3.96	N	Calm	1.67
31	N W by W	S S W (?)	5.37	W by N	None	0.00
	......	......	5.65	......	......	2.29

Gangaroowa near Kandy, Ceylon.

Distance in Miles in 24 Hours.	Lightning and Thunder.
56.56	
67.01	
82.71	
102.35	
78.52	
71.28	
62 50	L. R. to N. E. in after even.
83.45	
85.75	
108.61	
113.03	
128.42	
117.36	
106.74	
83.81	
34.64	
67.67	
77.36	
50.04	L. R. to N. E. in after even.
33.93	Th. in fore even. L. R. to N. E. in after even.
41.97	Th. in fore even. L. R. to N. E. & S. E. in after even.
41.92	Th. in afternoon. L. & L. R. & Th. to N—N. E. & L. R. to E. & S. E. in after even.
52.74	L. R. to N. N. E—N. E. & E. & S. E. in after even.
48.38	Th. in afternoon. L. R. to N. by E. & L. & Th. to S. E. in after even.
32.91	Th. in afternoon.
33.03	Th. in afternoon.
51.90	Th. in afternoon.
49.10	Th. in afternoon.
52.55	L. & Th. a few Miles distant in after even.
40.50	Th. in afternoon, fore and after even; L. & L. R. & Th. to N. E. in after even.
50.23	
67.97	

Gangaroowa near Kandy, Ceylon.

August, 1863.	GENERAL REMARKS.
1	Cloudy, but fine, fresh and dry.
2	Fine till 11 o'clock, Showery after.
3	Mild to warm and damp, showery all day.
4	Rain during the night; cloudy but pleasant day.
5	Fine, dry and pleasant day.
6	Cloudy, mild to warm, pleasant, light showers.
7	Damp and showery till 3 P. M., then fine and pleasant.
8	Damp and showery till 3 P. M., then fine and pleasant.
9	Showers till 3.30 P. M., cloudy and damp all day.
10	Mild to warm and pleasant, cloudy, a little rain.
11	Mild to warm and pleasant, cloudy, light showers.
12	Mild to warm and pleasant, cloudy, light showers.
13	Damp, rather heavy showers all day.
14	Mild to warm and pleasant; cloudy, showers.
15	Mild to warm and pleasant; cloudy, a little rain.
16	Damp, showers throughout the day.
17	Very damp; heavy rain in morn, showers after.
18	Cloudy, fine pleasant day.
19	Fine, clear morn and forenoon, cloudy, hot and sultry after.
20	Fine, clear morn and forenoon, cloudy, hot and sultry after.
21	Fine, clear morn and forenoon, cloudy, hot and sultry after.
22	Fine, clear morn and forenoon, cloudy, hot and sultry after.
23	Fine, clear morn and forenoon, cloudy, hot and sultry after.
24	Cloudy all day; fresh morn, hot and sultry at noon and after.
25	Cloudy, fresh morn and forenoon; hot and very sultry after.
26	Cloudy, fresh morn, very hot and sultry after.
27	Cloudy, fresh morn, very hot and sultry after.
28	Cloudy, fresh morn, hot forenoon, a little rain in afternoon and then mild [and pleasant.
29	Rain at night and in even, cloudy, fine day.
30	Fine fresh morn, hot noon & very sultry after heavy clouds & rain in even.
31	Cloudy but fine pleasant day.
	Solar Halo on 1st, 12th, 22nd, Lunar Halo on 1st, 29th.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of September, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standards.

The tension of aqueous vapour, from which are deduced the pressure of dry air, the dew point and humidity, has been found by the formula $f = f' - \frac{d}{88} \times \frac{h}{30}$ given in Mr. Drew's "Practical Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain gauge is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W. S. W. those in the next higher from N. N. W.; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

September, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.271	28.179	28.245	27.593	27.471	27.586	73.3	73.1	69.8	67.9	69.2	67.0
2	.257	.169	.275	.553	.421	.603	74.8	75.0	70.7	69.0	70.9	67.6
3	.280	.193	.284	.555	.472	.627	74.1	76.2	68.7	69.9	69.7	66.9
4	.396	.205	.276	.558	.464	.601	73.1	72.9	69.8	70.9	70.6	67.8
5	.280	.186	.270	.555	.440	.635	73.1	75.5	71.1	69.9	70.8	65.9
6	.288	.195	.276	.563	.462	.602	73.8	75.0	72.4	69.9	70.3	67.7
7	.304	.222	.326	.592	.492	.665	74.0	77.0	72.1	69.3	70.1	67.1
8	.349	.252	.342	.653	.500	.715	74.8	76.9	70.0	68.7	71.0	65.5
9	.348	.240	.319	.645	.511	.678	75.5	77.7	69.0	68.9	70.1	66.1
10	.339	.221	.315	.651	.511	.677	76.2	78.2	71.1	68.3	69.2	66.0
11	.366	.248	.342	.665	.486	.677	76.0	78.0	70.1	68.9	71.4	67.3
12	.390	.296	.400	.667	.562	.691	75.9	77.2	71.7	69.8	70.3	69.2
13	.427	.323	.441	.681	.547	.733	75.1	75.0	70.8	70.8	72.0	69.2
14	.434	.330	.401	.685	.564	.714	75.5	75.6	71.2	70.9	71.6	68.3
15	.402	.294	.392	.651	.533	.703	74.7	74.4	71.3	71.0	71.4	68.4
16	.364	.249	.362	.593	.478	.653	74.8	74.1	71.0	71.8	71.8	69.2
17	.343	.230	.356	.592	.444	.662	73.3	75.1	71.2	71.0	72.4	68.6
18	.363	.263	.363	.626	.477	.676	73.6	74.7	71.2	70.4	72.4	68.3
19	.352	.246	.344	.612	.491	.686	73.0	76.3	71.1	70.5	71.2	66.9
20	.333	.215	.304	.624	.489	.664	73.6	76.0	69.1	69.2	70.0	66.1
21	.322	.205	.303	.649	.482	.700	73.5	76.0	71.0	67.6	69.8	64.3
22	.297	.183	.298	.625	.485	.637	74.8	77.0	72.7	67.6	68.7	67.1
23	.301	.217	.333	.603	.531	.680	71.3	77.1	72.8	68.8	68.2	66.7
24	.360	.253	.358	.631	.562	.808	75.0	77.3	71.0	70.1	68.4	61.5
25	.375	.245	.347	.702	.535	.706	74.1	77.2	72.0	67.6	69.2	66.2
26	.364	.264	.367	.647	.497	.739	73.8	74.8	68.1	69.6	71.7	65.5
27	.368	.249	.351	.668	.555	.736	74.8	77.7	66.7	68.8	68.5	64.9
28	.367	.248	.341	.685	.514	.705	72.0	73.9	68.0	68.0	70.3	65.9
29	.345	.234	.349	.692	.527	.731	74.1	78.1	69.6	66.7	69.1	65.1
30	.337	.243	.336	.764	.581	.713	75.6	79.0	68.3	62.8	67.1	65.3
	28.341	28.237	28.334	27.633	27.503	27.680	74.3	76.1	70.5	69.2	70.2	66.7

GANGAROOWA NEAR KANDY, CEYLON.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0								A. M. 9.30	P. M. 10.0	Total.
839	881	912	105.5	65.2	76.0	68.8	7.2	72.4	0	0.005	0.041	0.046
829	876	904	121.1	62.5	77.7	67.3	10.4	75.5	129	0.000	0.340	0.340
874	812	943	0	63.1	78 0	66.7	11.3	72.4	120	0.000	0.010	0.010
933	929	935	93.9	62.0	75.4	66.7	8.7	71.0	0	0.177	0.237	0.414
902	859	843	95 9	65.8	76.3	68.8	7.5	72.6	260	0.006	0.033	0.039
882	859	858	108.7	64.0	76.1	69.4	6.7	72.7	259	0.000	0.002	0.002
861	802	849	0	66.5	77.8	69.7	8.1	73.8	222	0.000	0.000	0.000
821	829	862	122.0	65.0	78.2	69.0	9.2	73.6	285	0.000	0.000	0.000
810	783	910	127.0	60.5	79.3	66.0	13.3	72.6	312	0.000	0.000	0.000
775	750	847	118.6	59.8	79.9	67.0	12.9	73.5	355	0.000	0.000	0.000
795	811	912	131.3	62.3	79.2	70.1	9.1	74.6	140	0.000	0.013	0.013
823	802	922	119.4	62.0	79.0	67.2	11.8	73.1	279	0 000	0.004	0.004
871	909	949	125.0	65.4	77.8	69.5	8.3	73.7	0	0.011	0.703	0.714
863	880	909	0	66.5	76.4	69.0	7.4	72.7	0	0.012	0.029	0.042
887	908	909	100.0	66.0	77.2	68.8	8.4	73.0	60	0.036	0.157	0.193
908	930	945	112.4	67.8	76.2	69.1	7.1	72.6	0	0.088	0.181	0.269
929	917	918	89.0	68.6	75.7	69.2	6 5	72.5	0	0.047	0.116	0.163
903	930	909	115.6	68.1	76.3	69.1	7.2	72.7	0	0.067	0.223	0.290
924	848	873	115.0	66.9	77.1	69.1	8.0	73.1	0	0.049	0.021	0.070
868	823	906	113.2	66.5	77.2	69.3	7.9	73.2	109	0.000	0.000	0.000
826	820	803	108.1	65.1	77.0	68.7	8.3	72.9	90	0.000	0.001	0.001
792	767	833	132.3	61.8	77.3	67.4	9.9	72.3	249	0.000	0.000	0.000
836	751	820	124.0	67.1	78.0	69.9	8.1	74.0	46	0.001	0 000	0.001
854	752	732	119.4	67.5	78.0	70.1	7.9	74.0	42	0.018	0.000	0.018
811	775	827	0	60.1	77.3	65.8	11.5	71.6	160	0.000	0.000	0.000
873	904	919	90.6	64.1	76.9	69.6	7.3	73.2	65	0.004	0.253	0.257
825	745	942	130.8	61.4	78.7	63.7	15.0	71.2	510	0.000	0.000	0.000
879	891	933	120.6	62.4	75.6	65.3	10.3	70.5	403	0.006	0.024	0.030
787	750	862	131.9	61.3	79.1	64.7	14.4	71.9	373	0.000	0.000	0.000
658	682	905	130.8	61.5	79.2	65.5	13.7	72.3	350	0.000	0.000	0.000
848	832	886	115.5	64.2	77.5	68.0	9.5	72.7	4818	0.527	2.388	2.915

Gangaroowa near Kandy, Ceylon.

	A. M. 9.30							P. M. 3.30						
Sepember, 1863.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0	0	0	0	0	10.0	10.0	0	0	0.7	0	0	9.3	10.0
2	0.7	0	0.5	0	8.6	0	9.8	0	0	0	0	0	10.0	10.0
3	0.4	0	5.0	0	3.8	0	9.2	1.5	0	0.3	0	0	8.2	10.0
4	0	0	0	0	0	9.7	9.7	0	0	0	0	0	10.0	10.0
5	0	0	1.6	0	0	8.0	9.6	0.5	0	0	0	0.2	9.0	9.7
6	0.2	0	0	0	0	9.8	10.0	0	3.3	0	0	0	6.7	10.0
7	0.2	0	0.3	0	0	9.5	10.0	2.0	0	0	0	7.4	0	9.4
8	0	8.5	0	0	1.5	0	10.0	5.0	0	0	0	5.0	0	10.0
9	5.0	0	0	0	5.0	0	10.0	4.7	0	0	0	4.5	0	9.2
10	1.4	0	0	0	7.8	0	9.2	0	0	0	0	6.7	0	6.7
11	0	0	0	0	2.5	0	2.5	0	0	0	0	6.0	0	6.0
12	0	0	0	0	9.5	0	9.5	0.4	0	1.2	0	2.0	0	3.6
13	0	0	0	0	9.0	0	9.0	0	0	0	0	0	10.0	10.0
14	0.2	0	1.0	0	6.8	0	9.0	0.3	0	0.1	0	0	8.8	9.2
15	0	0	0.4	0	0	9.6	10.0	0	0	2.0	0.2	0	7.0	9.2
16	0	0	0.1	0	0	9.6	9.7	0	0	0	0	0	10.0	10.0
17	0	0	0	0	0	9.8	9.8	0	1.5	0.2	0	0	8.2	9.9
18	0.8	0	0	0	0	9.2	10.0	0	0	3.8	0	0	6.0	9.8
19	0.3	0	0	0	0	9.4	9.7	1.0	0	0	0	0	8.8	9.8
20	0.4	0	0	0	0	9.6	10.0	2.0	0	0	0	8.0	0	10.0
21	2.4	0	0	0	7.5	0	9.9	0.2	0	0	0	5.0	0	5.2
22	7.5	0	0	0	2.5	0	10.0	0	6.0	0	0	4.0	0	10.0
23	0	0	0	0	0	9.2	9.2	6.6	0	0	0	3.0	0	9.6
24	4.4	0	0	0	5.0	0	9.4	0.8	0	0	0	3.0	0	3.8
25	0	0	0	0	9.6	0	9.6	2.6	0	0	0	7.0	0	9.6
26	1.0	0	0.2	0	0	7.3	8.5	0	0	0	0	0	10.0	10.0
27	2.4	0	0.1	0	1.8	0	4.3	2.2	0	0	0	0.8	0	3.0
28	1.5	0	0	0	0	8.5	10.0	1.0	0	7.0	0	0	1.7	9.7
29	0.5	0	0	0	8.5	0	9.0	7.8	0	0	0	1.7	0	9.5
30	9.5	0	0	0	0	0	9.5	5.7	0	0	0	2.5	0	8.2
	1.3	0.3	0.3	0.0	3.0	4.3	9.2	1.5	0.4	0.5	0.0	2.2	4.1	8.7

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
4.0	0	2.5	0	0	0	6.5	0	3	W by S	W S W	7.39
0	0	0	0	0	10.0	10.0	2	3	W by S	W S W	8.18
0	0	0	0	0.4	0	0.4	1	1	W S W	S W	5.98
0	0	9.7	0	0	0	9.7	2	2	W N W	W S W	6.16
0	0	0	0	0	10.0	10.0	2	2	W by S	W S W	8.45
0.5	0	0	0	0	9.5	10.0	0	0	W S W	W S W	5.46
0	0	0	0	9.7	0	9.7	0	0	?	W S W	11.70
0	0	0	0	0	0	0.0	0	2	S W	W S W	8.71
0	0	0	0	0	0	0.0	0	1	W S W	W S W	4.49
0	0	0	0	9.5	0	9.5	0	0	S W	W S W	8.00
0	0	0	0	0	0	0.0	0	1	S W	W S W	9.86
0	0	0	0	0	9.7	9.7	0	0	S W by W	W S W	5.90
0	0	0	0	0	10.0	10.0	1	1	S W	S W	1.41
0	0	0	0	0	10.0	10.0	0	0	S W	S W by W	6.86
0	0	0	0	0	9.8	9.8	1	1	W S W	W S W	7.57
0	0	0	0	0	10.0	10.0	1	0	W S W	W S W	7.22
0	0	0	0	0	10.0	10.0	1	1	W S W	W S W	3.96
2.7	0	0	0	2.0	0	4.7	1	1	W S W	W by S	6.34
7.5	0	0	0	1.0	0	8.5	2	1	W S W	W S W	3.43
9.0	0	0	0	1.0	0	10 0	0	1	S W by W	W S W	8.54
7.0	0	0	0	0	0	7.0	0	0	S W by S	W S W	5.63
0	0	0	0	10.0	0	10.0	0	0	S W	W by S	6.78
0	0	0	0	10.0	0	10.0	0	0	S W	W S W	10.56
0	0	0	0	0	0	0.0	0	0	W S W	W S W	12.32
0	0	0	0	9.7	0	9.7	0	1	S W by W	W S W	6.86
.10.0	0	0	0	0	0	10.0	1	1	W N W	W S W	8.00
9.4	0	0	0	0	0	9.4	0	1	W by N	W S W	6.16
0.6	0	0.4	0	0	0	1.0	2	1	W by S	W S W	5.28
0	0	7.5	0	0	0	7.5	1	1	W by N	W S W	5.54
3.8	0	0	0	0	0	3.8	0	1	W by S	Nono	4.22
1.8	0.0	0.7	0.0	1.8	3.0	7.3	0.6	0.9	......	......	6.90

Gangaroowa near Kandy, Ceylon.

September, 1863.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	S	W S W	5.28	W N W	Nono	1.85
2	W by N	W S W	2.73	W by S	?	2.02
3	W S W	W S W	7.66	N N E	?	0.88
4	S S W	W S W	3.78	W	None	3.70
5	S W	W S W	10.38	W by N	?	6.86
6	S W by W	W S W	8.62	W	W	4.40
7	S W	W S W	10.30	S S E	?	0.97
8	W by S	W S W	6.86	W N W	None	3.87
9	W (?)	W by S	10.82	Calm	None	0.00
10	W by S	W S W	8.54	W	W S W	3.87
11	W S W	W S W	10.21	N W	Nono	2.55
12	W by S	W S W	7.74	N W by W	?	1.76
13	W by S	W S W	5.63	W by S	W S W	0.26
14	W S W	W S W	8.89	W by S	?	0.53
15	W S W	W S W	4.75	S W by S	W	1.67
16	S W	W S W	7.39	W N W	W S W	0.00
17	S W by W	S W by W	3.43	W	W S W	5.63
18	W N W	W by S	10.38	W S W	W by S	4.93
19	W	W S W	11.53	W S W	W by S	4.66
20	W S W	W by S	9.94	W	W S W	0.18
21	W by S	W by S	9.77	W	W S W	2.99
22	S W by W	W by S	8.71	W by S	W S W	2.11
23	W by S	W S W	11.44	W S W	W S W	5.98
24	W S W	W by S	13.38	S W	Nono	3.08
25	S W	W S W & Calm	8.80	W S W	W S W	1.50
26	W N W	W S W	0.88	W N W	None	3.52
27	W by N	W S W	9.59	N W by N	None	1.67
28	S W by W	W S W	7.92	N W by N	E S E	1.50
29	W S W	W S W	7.92	W	Nono	2.46
30	W by S	W S W	9.42	N W	None	1.67
	......	......	8.09	......	......	2.57

GANGAROOWA NEAR KANDY, CEYLON.

Distance in Miles in 24 Hours.	Lightning and Thunder.
53.31	
60.65	
74.26	
73.30	
96.36	
120.39	
101.45	
78.38	
72.29	
90.95	
76.53	
62.83	
55.49	
70.95	
62.14	
67.64	
61.88	
95.09	
101.00	
91.31	
116.82	
111.77	
130.24	
109.61	
77.47	
58.04	
65.95	
64.11	
67.28	
66.42	
81.13	

Gangaroowa near Kandy, Ceylon.

September, 1863.	GENERAL REMARKS.
1	Mild to warm and pleasant, Light showers.
2	Mild to warm and pleasant, showers afternoon and all even.
3	Mild to warm and pleasant, very light showers.
4	Mild and damp; showers at night, all morn and all noon.
5	Mild to warm, pleasant, rather damp; showery.
6	Mild to warm, pleasant; cloudy but fine.
7	Mild to warm, pleasant; cloudy but fine.
8	Mild to warm, pleasant; high clouds, clear at night.
9	Mild to very warm, fresh and pleasant; clear and cool all night.
10	Mild to very warm, fresh and pleasant; cloudy.
11	Mild to hot, pleasant; light rain afternoon, clear night.
12	Mild to hot, pleasant; a little rain in after even.
13	Mild to hot, till noon; rain afternoon and all even.
14	Mild to warm, pleasant; showery.
15	Mild to warm, damp but pleasant; showers.
16	Mild to warm, damp; frequent light showers.
17	Mild to warm, damp; frequent light showers.
18	Mild to warm, damp; frequent light showers.
19	Mild to warm, pleasant; some light showers.
20	Mild to warm, pleasant; cloudy but fine.
21	Mild to warm, pleasant; a littlo rain.
22	Mild to warm, pleasant; cloudy, fine.
23	Mild to warm, pleasant; clouds, mostly high.
24	Rain at night; fine, dry, fresh day.
25	Cloudy, fine dry and pleasant.
26	Mild to warm, pleasant; showery till 3. p. m. fine after.
27	Fine, dry and fresh day.
28	Mild to warm, at times raw and damp; showers.
29	Mild to hot, fresh; clouds mostly high; cool after even.
30	Mild to hot, fresh; clouds mostly high; cool after even.
	Solar Halos on 6th, 10th, 19th, 20th, 21st, 28th. Lunar Halos on 20th, 26th, 27th, 29th.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of October, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standards.

The tension of aqueous vapour, from which are deduced the pressure of dry air, the dew point and humidity, has been found by the formula $f=f'-\frac{d}{88}\times\frac{h}{30}$ given in Mr. Drew's "Practical Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain guage is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W. S. W. those in the next higher from N. N. W.; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

October, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.303	28.211	28.328	27.603	27.495	27.672	76.1	79.6	71.3	68.8	69.5	66.8
2	.332	.219	.337	.643	.527	.651	77.1	79.2	72.2	68.4	68.5	68.2
3	.365	.241	.345	.619	.556	.690	74.5	79.8	71.4	70.8	68.2	66.8
4	.350	.247	.340	.648	.516	.655	77.9	79.9	70.8	68.9	70.2	68.2
5	.344	.232	.317	.581	.497	.616	74.2	73.2	70.5	71.5	70.3	68.9
6	.331	.216	.333	.584	.488	.691	73.7	76.8	70.1	70.8	70.1	66.2
7	.362	.223	.347	.629	.465	.643	74.0	79.1	71.5	70.3	71.3	69.0
8	.357	.226	.398	.631	.446	.695	76.0	79.1	72.9	70.0	72.2	68.9
9	.378	.239	.371	.654	.479	.667	75.5	79.2	70.9	69.9	71.4	69.0
10	.339	.218	.342	.606	.432	.662	76.0	77.1	72.2	70.2	72.4	67.9
11	.369	.239	.350	.680	.489	.687	76.1	77.8	71.9	68.4	70.9	67.2
12	.384	.278	.402	.669	.559	.743	75.3	77.0	70.0	69.5	69.6	67.0
13	.388	.269	.373	.654	.512	.667	74.2	76.1	71.3	70.3	71.2	69.1
14	.354	.261	.348	.568	.497	.620	75.1	74.1	71.2	72.4	71.5	70.0
15	.364	.229	.328	.605	.453	.586	72.9	77.1	71.8	71.3	72.0	70.6
16	.359	.248	.367	.593	.437	.629	75.6	76.9	71.9	71.6	73.4	70.4
17	.332	.208	.271	.586	.454	.542	73.1	72.7	71.1	70.8	71.1	70.1
18	.270	.170	.221	.526	.417	.491	73.3	72.8	71.0	70.7	71.1	70.1
19	.206	.127	.203	.501	.428	.531	70.8	71.1	69.2	69.0	68.8	67.6
20	.274	.180	.324	.593	.487	.706	74.0	76.1	66.7	68.0	68.5	65.0
21	.360	.255	.394	.641	.500	.684	74.3	76.3	71.0	69.7	71.2	69.2
22	.393	.278	.365	.723	.558	.688	75.9	76.9	69.3	67.5	69.7	67.8
23	.373	.250	.334	.732	.507	.632	73.6	77.1	71.1	66.1	70.7	68.9
24	.373	.272	.350	.652	.509	.652	75.1	74.5	70.2	69.7	71.5	68.7
25	.410	.268	.380	.685	.524	.672	72.1	75.0	71.1	69.9	70.7	69.2
26	.379	.237	.343	.617	.493	.699	75.0	76.7	70.8	71.4	70.7	66.3
27	.312	.186	.311	.581	.403	.602	75.5	78.1	72.3	70.2	72.3	69.2
28	.354	.261	.367	.650	.519	.735	76.0	77.8	67.4	69.0	70.6	65.7
29	.379	.267	.379	.728	.519	.630	73.6	79.0	72.5	66.6	70.9	70.9
30	.380	.273	.363	.643	.507	.686	75.0	75.9	69.9	70.4	71.6	67.8
31	.349	.222	.342	.692	.480	.619	72.1	76.5	72.0	66.9	70.6	69.8
	28.349	28.234	28.341	27.630	27.489	27.650	74.6	76.7	70.9	69.6	70.7	68.4

Gangaroowa near Kandy, Ceylon.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0								A. M. 9.30	P. M. 10.0	Total.
791	724	864	0	60.1	80.7	64.1	16.6	72.4	429	0.000	0.000	0.000
755	709	879	128.0	63.4	81.3	67.5	13.8	74.4	276	0.000	0.000	0.000
887	689	860	0	64.7	80.0	68.8	11.2	74.4	209	0.008	0.000	0.008
749	732	918	116.5	61.9	80.6	66.6	14.0	73.6	332	0.000	0.003	0.003
917	911	949	101.2	67.3	75.5	68.6	6.9	72.1	0	0.248	0.581	0.829
912	805	880	130.5	66.7	77.7	68.3	9.4	73.0	0	0.207	0.011	0.218
886	779	922	134.6	63.1	80.0	66.3	13.7	73.1	238	0.000	0.027	0.027
823	802	880	138.0	66.2	80.4	68.6	11.8	74.5	95	0.000	0.000	0.000
834	779	940	140.2	67.0	80.7	70.3	10.4	75.5	177	0.000	0.010	0.010
831	861	870	130.9	62.9	80.9	67.4	13.5	74.2	271	0.000	0.006	0.006
779	805	857	117.6	64.4	79.3	68.6	10.7	73.9	90	0.015	0.000	0.015
830	790	907	118.1	66.0	78.5	68.7	9.8	73.6	56	0.003	0.000	0.003
882	856	931	101.4	63.4	77.0	67.7	9.3	72.4	100	0.006	0.282	0.288
917	921	960	118.6	66.8	79.1	69.7	9.4	74.4	123	0.135	0.600	0.735
951	849	963	111.0	68.6	79.0	69.3	9.7	74.1	0	0.589	0.036	0.625
879	894	954	116.8	67.8	79.0	68.6	10.4	73.8	0	0.022	0.201	0.223
929	951	968	83.4	68.2	75.0	69.4	5.6	72.2	0	0.026	1.372	1.398
920	946	972	89.0	68.5	74.5	69.4	5.1	72.0	0	0.046	0.255	0.301
945	927	948	76.0	66.6	72.0	68.0	4.0	70.0	0	2.707	1.419	4.126
823	783	947	119.0	64.6	77.0	66.5	10.5	71.7	0	0.107	0.000	0.107
861	848	947	132.4	57.0	79.1	62.8	16.3	71.0	483	0.000	0.000	0.000
763	794	952	132.6	58.0	78.2	64.4	13.8	71.3	447	0.000	0.000	0.000
785	814	931	0	63.2	78.5	65.3	13.2	71.9	418	0.000	0.001	0.001
842	908	954	85.9	66.6	77.1	69.3	7.8	73.2	125	0.000	0.083	0.083
932	871	940	100.9	0	75.6	68.3	7.3	71.9	385	0.245	0.037	0.282
892	825	864	110.0	66.0	78.7	68.8	9.9	73.8	137	0.066	0.001	0.067
842	831	905	134.2	67.6	79.3	69.0	10.3	74.1	151	0.017	0.000	0.017
799	795	947	136.0	60.5	79.0	66.2	12.8	72.6	418	0.000	0.000	0.000
797	771	950	138.0	54.0	80.0	60.2	19.8	70.1	622	0.000	0.117	0.117
863	872	935	112.0	66.3	77.3	67.5	9.8	72.4	237	0.000	0.000	0.000
844	828	932	136.1	59.5	76.5	64.3	12.2	70.4	385	0.000	0.000	0.000
854	828	923	117.8	64.2	78.3	67.4	10.9	72.8	6204	4.447	5.042	9.489

Gangaroowa near Kandy, Ceylon.

	A. M. 9.30							P. M. 3.30						
October, 1863.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.1	0	0	0	9.0	0	9.1	6.0	0	0	0	2.0	0	8.0
3	0.7	0	0	0	0	3.3	4.0	0.7	0	0	0	2.0	0	2.7
4	0.3	0	0	0	3.3	0	3.6	4.0	0	0	0	2.5	0	6.5
5	0.2	0	1.0	0	0	8.3	9.5	0	0	0.5	0	0	9.2	9.7
6	S	0	0.9	0	0	9.0	9.9	0.4	0	0	0	2.5	0	2.9
7	0	0	0	0	0	9.0	9.0	0	0	6.4	0	1.6	0	8.0
8	1.5	0	2.5	0	0.1	0	4.1	0	7.1	0.3	0.4	1.7	0	9.5
9	6.1	0	0.3	0	3.0	0	9.4	0	7.6	0	1.2	1.2	0	10.0
10	2.0	0	2.5	0	0.1	0	4.6	0	1.4	0.4	0	0	8.0	9.8
11	4.5	0	0	0	5.0	0	9.5	0	7.6	0.1	0	2.0	0	9.7
12	6.4	0	0	0	3.3	0	9.7	1.6	6.3	0.1	0	1.7	0	9.7
13	0.2	0	0.8	0	0	9.0	10.0	2.0	0	4.4	0.2	3.0	0	9.6
14	0.8	0	0	0	0	8.2	9.0	0	0.3	0	0	0	9.7	10.0
15	0	0	S	0	0	10.0	10.0	0.6	0	0.3	0.2	2.0	0	3.1
16	8 7	0	0	0	1.2	0	9.9	0	3.0	0	0	0	7.0	10.0
17	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
18	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
19	0	0	0	0	0	10.0	10.0	0.2	0	0	0	0	9.8	10.0
20	1.0	0	0.8	0.2	5.0	0	7.0	S	0	0.3	0	0.7	0	1.0
21	0	0	0.4	0	5.0	0	5.4	0	1.0	0	0	0	8.8	9.8
22	2.5	0	1.2	0	0.3	0	4.0	8.4	0	0	0	1.2	0	9.6
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24	0	0	1.6	0	0	8.0	9.6	0	1.0	8.6	0	0	0.4	10.0
25	0	6.3	0.4	0	0	3.3	10.0	0.2	0	6.8	0	0	2.6	9 6
26	0	0	0	0	2.0	0	2.0	1.0	0	0	0	3.3	0	4.3
27	0	0	0	0	2.5	0	2.5	0	0	0	0	0.6	0	0.6
28	5.0	0	0	0	0.6	0	5.6	0	7.8	0	0	0	1.0	8.8
29	0.2	0	0	0	0	0	0.2	2.8	3.0	0.2	0	3.0	0	9.0
30	8 0	0	1.0	0	0.7	0	9.7	0	8.5	S	0	0	1.5	10 0
31	2.8	0	6.8	0	0.2	0	9.8	0	9.2	0.2	0.1	0.3	0	9.8
	1.8	0.2	0.7	0.0	1.4	3.4	7.5	0.9	2.2	1.0	0.1	1.1	2.7	8.0

GANGAROOWA NEAR KANDY, CEYLON.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	S	0	0.5	0	0.5	0	1	......	.....	0.00
0	0	0	0	9.9	0	9.9	1	1	W N W	W S W	7.39
0	0	0	0	0.2	0	0.2	1	1	S W by W	S W by W	2.73
0	0	0	0	0	10.0	10.0	0	0	W	W S W	10.56
0	0	0	0	0	10.0	10.0	2	2	S W	W S W	10.12
0	0	0	0	0	0	0.0	2	0	W by S	W S W	6.78
0	0	0	0	0	10.0	10.0	0	0	W S W	S W	4.93
1.0	0	9.0	0	0	0	10.0	2	0	S W by W	S S W (?)	8.62
0	8.3	0	0	0	0	8.3	Ozone papers finished and new supply not yet received.	Ozone papers finished and new supply not yet received.	W	S S W (?)	4.40
0	0	0	0	8.0	0	8.0			S W	Calm (?)	2.11
0	0	0	0	9.6	0	9.6			S W by S	S S W	6.42
2.0	0	0	0	0	0	2.0			W S W	S W by W	7 30
0	10.0	0	0	0	0	10 0			S W	W S W	2.82
0	8.9	0	0	0	1.0	9.9			W S W	W S W	6.78
0	9.8	0	0	0	0	9.8			W N W	W S W	3 52
0	1.0	0	0	0	9.0	10.0			W	W S W	4.31
0	0	0	0	0	10.0	10.0			W	W by S	5.90
0	0	0	0	0	10.0	10.0			S W by S	W by S	0.00
0	0	0	0	0	10.0	10.0			W	W S W	2.99
0	0	0	0	1.0	0	1.0			S S E	S W by W	7.83
7.6	0	2.0	0	0	0	9.6			W by N	S by W	4.75
0	10.0	0	0	0	0	10.0			S W	W S W	7.39
0	10.0	0	0	0	0	10.0			.. ..	... ..	0.00
5.0	5.0	0	0	0	0	10.0			W by S	W S W	5.63
0.5	0	6.2	0	2.5	0	9.2			W	W S W	4.05
0	0	0	0	10.0	0	10.0			S W by W	S W by W	5.63
0	S	0	S	9.0	0	9.0			S W by W	W S W	3.34
0.7	0.3	0	0	0	0	1.0			W by S	W S W & Calm	2.20
0	0	0.8	0	0	8.2	9.0			W by S	None	2.38
8.0	0	2.0	0	0	0	10.0			W	W S W	3.43
0	0	0	0	9.4	0	9.4			W S W	W S W & Calm	0.35
0.8	2.0	0.7	0.0	1.9	2.5	7.8			......	......	4.99

Gangaroowa near Kandy, Ceylon.

October, 1863.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	......	......	0.00	W N W	W S W	3.43
2	W	W S W	8.10	N W by W	W S W	3.17
3	W by S	W S W	14.34	W S W	W S W	5.11
4	W S W	W S W	7.13	N N W	?	0.88
5	S W	W by S	8.71	W	?	1.67
6	W S W	W S W & N E	7.04	W by N	None	4.31
7	W	W S W & Calm	7.74	W by S	?	3.52
8	W	W by S & Calm	8.36	W S W	None	2.11
9	W S W	Calm	4.93	W by S	None	0.00
10	S	Calm	1.67	W S W	?	3.17
11	W N W	Calm	4.14	N N W	?	2.02
12	W S W	W S W & Calm	4.58	N W by N	None	1.67
13	W S W	W S W, N W & Calm	5.90	S W by W	None	0.70
14	N	W by N	0.88	W by N	?	2.20
15	W S W	W S W	4.93	W N W	None	1.23
16	W by S	W S W	7.92	S W by W	W S W	1.14
17	W S W	W S W & Calm	4.93	W	W S W	1.94
18	N W by W	N N W	1.41	W S W	?	1.23
19	W S W	W S W	0.88	W by S	S W	1.58
20	W by S	S S W	7.83	N	Calm	0.70
21	W N W	W S W	3.34	N N W	None	1.06
22	S W by S	W by S	2.64	N N W	None	0.97
23	......		0 00	N N W	None	1.76
24	W by N	W S W	0.62	S W (?)	S W by W	0.00
25	W by S	S W	7 66	W N W	S W	1.41
26	W	W S W	8.98	W by S	W S W	4.66
27	W N W	W S W (?)	7.13	W S W	S S W	1.85
28	W N W	Calm	5.54	N W by W	None	0.18
29	W	Variable	7.04	Calm	Calm ?	0.00
30	W	S E	1.23	N N W	None	4.40
31	?	Calm	1.76	W by S	Calm ?	1.06
	......	......	5.43	......	......	1.91

GANGAROOWA NEAR KANDY, CEYLON.

Distance in Miles in 24 Hours.	Lightning and Thunder.
70.28	
77.90	
82.28	
69.40	
69.14	
69.62	L R to E N E in after even.
63 89	Th. in fore even. L R to E in after even.
67.40	Th. in fore even. L and L R to N E in after even.
46.12	L & Th. near in fore even & dist. to E S E in after even & L R to S E.
35.07	Th. in after noon, L to E in after even.
48.47	In fore even Th. and L R to E N E in after even.
54.90	L R to N E in after even.
38.27	L R to E S E in after even.
30.42	L and Th. not far in after noon.
45.54	L and L R to E N E and E at even and in after even.
53.48	Th. in fore even.
40.02	Th. at 3 P. M.
12.53	Th. at noon; L R to W, W S W at even and after.
63.17	
71.21	
38.66	
31.60	Faint L R at even.
36.77	L to E N E at even.
28.79	
46.48	
72.55	
47.57	In after even L and Th. dist. to E, L and L R to E N E and N E.
42.25	L R to N E at even and after, L R to N—N N E.
39.37	Th. in fore even; L and Th. and L R to N E in after even.
27.42	Th. in after noon.
24.14	L R to N E in after even, Th. at 10.0 P. M.
49.83	

Gangaroowa near Kandy, Ceylon.

October, 1863.	GENERAL REMARKS.
1	Fine, hot and dry day.
2	Fine, hot and dry day.
3	A little rain at 9 A. M. fine, hot and dry after.
4	Cool at morn, fine, hot and dry till even. ; a little rain in after even.
5	Mild to rain, damp; showers all day.
6	Mild and damp with rain till noon ; fine and pleasant after.
7	Cloudy till 10 or 11 A. M., fine at noon ; heavy clouds and light rain after.
8	Fine, mild to hot and fresh till even, cloudy and sultry after.
9	More or less cloudy all day ; heavy clouds and light rain fore after even.
10	Fine till noon ; heavy clouds and rain in after noon ; fine again after.
11	Rain at night; fine and fresh till 3 P. M and then sultry.
12	Rain at night ; fine and pleasant all day.
13	Rain at night & in fore & after noon ; at times damp and raw or muggy.
14	Mild and damp, and showery all day.
15	Much rain till 9 A. M. ; light showers after, very damp.
16	Mild to warm and damp ; light showers.
17	Mild and very damp ; rain all day, heavy in after noon.
18	Very damp : light rain greater part of the day.
19	Raw and very damp : rain at times heavy night and day till 6 P. M.
20	Rain at night, fine, dry and pleasant day.
21	Fine, pleasant day ; cloudy fore and after noon.
22	Fine, fresh and pleasant day.
23	Fine, fresh and pleasant day ; a little rain in after even.
24	Mild to raw and damp; light rain fore and after noon.
25	Mild to raw and damp ; showers of light rain all day.
26	Light rain till 7 A. M. and in afternoon ; mild to warm and pleasant.
27	Light rain before morn, fine, mild to hot and fresh day.
28	Fine, mild to hot day, sultry in afternoon.
29	Fine, fresh till noon ; sultry after, and in after even, cloudy & light rain.
30	Fine & pleasant till noon ; then sultry, heavy Nimb. at even, but no rain.
31	Fine, mild to warm and pleasant day.
	Solar Halos on 11th, 12th, 15th, 16th, 30th, 31st. Lunar Halo on 24th.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of November, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standards.

The tension of aqueous vapour, from which are dedueed the pressure of dry air, the dew point and humidity, has been found by the formula $f = f' - \frac{d}{88} \times \frac{h}{30}$ given in Mr. Drew's "Praetieal Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen eloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain guage is $4\frac{1}{2}$ feet above the ground.

The ozone eage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the eurrents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "ealm" signifies that the elouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direetion, but their parts move as if in vortiees, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, sueh as W S W and N N W or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the elouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The veloeity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder.

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its refleetion on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

November, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.329	28.198	28.325	27.603	27.433	27.623	76.0	78.4	71.7	70.0	71.6	68.9
2	.315	.215	.305	.553	.423	.594	76.0	75.9	70.6	71.4	72.6	69.3
3	.332	.227	.333	.576	.448	.664	75.9	75.1	68.5	71.2	72.1	67.5
4	.362	.254	.367	.633	.492	.669	73.7	75.0	70.2	70.1	71.4	68.7
5	.338	.228	.320	.629	.459	.613	73.3	74.0	70.3	69.2	71.7	69.1
6	.317	.208	.326	.596	.500	.686	74.1	76.7	67.9	69.8	69.2	66.1
7	.340	.234	„	.687	.521	„	73.1	76.6	„	66.7	69.4	„
8	.373	.256	.378	.718	.510	.645	74.2	78.5	72.0	66.8	70.8	70.3
9	.359	.251	.372	.630	.503	.621	75.0	78.0	73.0	70.1	70.9	71.0
10	.361	.252	.383	.688	.557	.653	75.7	78.6	72.3	67.6	68.6	70.1
11	.389	.270	.381	.772	.516	.710	76.5	79.5	73.3	65.0	69.9	67.6
12	.382	.270	.371	.661	.598	.676	76.1	79.4	70.8	69.7	67.6	68.6
13	.360	.272	.382	.678	.551	.686	76.1	79.1	71.0	68.1	69.8	68.7
14	.346	.237	.344	.599	.481	.600	77.0	81.0	73.0	70.8	71.2	70.7
15	.372	.250	.335	.728	.544	.637	76.5	80.2	71.1	66.3	69.1	68.8
16	.354	.233	.342	.636	.453	.621	77.2	76.3	72.8	69.6	72.2	69.7
17	.343	.232	.350	.643	.461	.649	75.1	74.5	70.2	68.8	71.8	68.9
18	.359	.272	.370	.585	.553	.730	75.5	72.7	67.3	71.9	69.6	66.1
19	.389	.295	.408	.665	.544	.716	74.5	73.0	69.5	69.9	71.0	68.5
20	.388	.263	.390	.660	.543	.721	75.1	76.6	71.9	70.1	69.7	67.5
21	.400	.248	.393	.709	.486	.746	75.9	77.3	68.1	68.4	71.5	66.4
22	.411	.285	.410	.749	.572	.721	76.0	76.5	72.0	67.2	69.4	68.3
23	.417	.292	.398	.716	.605	.747	77.0	78.0	73.0	68.9	68.2	66.6
24	.422	.304	.411	.824	.571	.721	76.0	79.0	71.2	64.1	70.3	68.4
25	.403	.283	.402	.735	.501	.682	77.1	76.5	70.7	67.4	72.2	69.7
26	.383	.253	.355	.672	.494	.643	73.8	77.6	70.8	69.3	71.3	69.3
27	.353	.246	.353	.658	.494	.753	75.9	77.9	73.1	68.6	71.0	64.1
28	.352	.257	.376	.662	.545	.827	75.7	78.0	69.3	68.4	69.3	61.5
29	.372	.253	.349	.864	.542	.690	67.9	75.1	70.0	59.1	69.3	67.0
30	.326	.249	.308	.572	.528	.623	75.0	72.5	69.8	71.1	69.7	68.2
	28.365	28.253	28.363	27.670	27.515	27.678	75.2	76.9	70.9	68.5	70.4	68.1

Gangaroowa near Kandy, Ceylon.

Humidity. A. M. 9.30	Humidity. P. M. 3.30	Humidity. P. M. 10.0	In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain. A. M. 9.30	Rain. P. M. 10.0	Rain. Total.
823	804	913	130.7	66.2	78.8	68.9	9.9	73.9	380	0.000	0.000	0.000
864	901	958	124.0	63 3	79.0	67.3	11.7	73.2	315	0.000	0.299	0.299
859	909	966	126.0	66.6	79.9	69.3	10.6	74.6	313	0.000	2.311	2.311
890	892	954	128.8	63.0	77.0	66.1	10.9	71.5	330	0.000	0.023	0.023
876	930	963	116.0	66.5	75.7	67.1	8.6	71.4	0	0.110	0.254	0.364
869	785	974	128.6	66.0	76.9	65.8	11.1	71.4	211	0.000	0.000	0.000
813	793	,,	133.0	58.6	77.0	62.7	14.3	69.8	546	0.000	0.000	0.000
787	781	945	123.0	60.6	78.4	63.8	14.6	71.1	394	0.000	0.000	0.000
854	795	937	140.0	61.4	79.0	67.6	11.4	73.3	253	0.000	0.000	0.000
770	725	932	,,	63.3	79.2	67.7	11.5	73.5	299	0.000	0.005	0.005
688	735	830	141 3	59.7	79.8	65.8	14.0	72.8	200	0.000	0 000	0.000
815	684	931	141.0	61.2	79.8	67.4	12.4	73.6	274	0.000	0.000	0.000
771	741	927	,,	60.0	80.2	64.8	15.4	72.5	291	0.000	0.000	0.000
821	731	929	145.6	63.6	81.3	68.8	12.5	75.0	188	0.000	0.000	0.000
718	701	927	139.5	58.4	81.1	65.2	15.9	73.2	366	0.000	0.000	0.000
783	876	906	128.2	63.5	80.1	68.3	11.8	74.2	193	0.000	0.115	0.115
817	917	958	93.8	63.3	77.4	68.7	8.7	73.0	204	0.000	1.514	1.514
892	906	961	133.0	68.0	78.7	68.3	10.4	73.5	0	0.055	1.456	1.511
862	938	967	127.3	61.3	78.2	64.8	13.4	71.5	247	0.000	0.201	0.201
850	801	865	120.0	65.2	78.2	67.2	11.0	72.7	329	0.000	0.029	0.029
786	829	940	134.5	61.0	78.5	64.1	14.4	71.3	409	0.000	0.001	0.001
756	796	887	128.0	56.7	78.5	63.2	15.3	70.9	469	0.000	0.015	0.015
770	731	812	116.0	65.7	78.4	70.0	8.4	74.2	99	0.000	0.000	0.000
678	756	913	138.3	59.8	80.2	66.1	14.1	73.1	293	0.000	0.000	0.000
732	873	967	142.6	61.0	80.0	67.0	13.0	73.5	204	0.000	0.526	0.526
865	818	954	124.2	60.2	77.7	65.1	12.6	71.4	248	0.000	0.105	0.105
790	803	747	125.0	64.3	79.1	68.8	10.3	74.0	108	0.014	0.002	0.016
790	757	773	130.0	60.3	78.5	66.7	11.8	72.6	236	0.000	0.001	0.001
748	829	907	134.0	50.0	75.9	58.3	17.6	67.1	345	0.000	0.000	0.000
883	915	949	102.7	65.2	75.8	68.5	7.3	72.1	0	0.001	0.652	0.653
808	815	917	128.4	62.1	78.6	66.4	12.2	72.5	7744	0.180	7.509	7.689

Gangaroowa near Kandy, Ceylon.

November, 1863.	A. M. 9.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	P. M. 3.30 Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	1.7	0	5.8	0	1.5	0	9.0	8.8	0	0	0	1.0	0	9.8
2	2.0	0	3.5	0	2.0	0	7.5	0	0	0	0	0	10.0	10.0
3	2.0	0	0	0	4.0	0	6.0	0	0	0	0	0	10.0	10.0
4	0.6	0	8.4	0	1.0	0	10.0	0	7.6	0.8	0	0.1	1.5	10.0
5	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
6	4.5	0	0.1	0	S	0	4.6	1.5	0	7.2	0	0.8	0	9.5
7	1.0	0	0	0	S	0	1.0	9.0	0	0	0	0.1	0	9.1
8	0.3	0	0	0	0.3	0	0.6	0.3	0	0	0	0.5	0	0.8
9	1.2	0	0	0	3.3	0	4.5	0.6	0	0	0	0.6	0	1.2
10	9.0	0	0	0	S	0	9.0	2.5	0	0	0	0.6	0	3.1
11	8.6	0	0	0	0	0	8.6	6.0	0.3	0	0	0.7	0	7.0
12	S	0	0	0	S	0	0.0	0.1	0	0	0.1	0.7	0	0.9
13	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0.8	0	0.8	0	0.3	1.0	0	0.8	0	2.1
15	S	0	S	0	0	0	0.0	0.4	0.2	7.3	0	0.3	0	8.2
16	0.5	0	5.5	0	2.5	0	8.5	0	1.0	0	0	0	8.9	9.9
17	2.5	0	6.5	0	1.0	0	10.0	0	0	0	0	0	10.0	10.0
18	0	0	0	0	8.5	0	8.5	0	0	0	0	0	10.0	10.0
19	5.0	0	0	0	0.8	0	5.8	0	0	0	0.1	0	9.8	9.9
20	0.3	0	0	0	9.0	0	9.3	0	1.0	1.2	0	0	7.5	9.7
21	2.0	0	0	0	0.1	0	2.1	0.1	0.3	0	0	5.4	0	5.8
22	0	0	0	0	0.3	0	0.3	0	0	8.0	0	1.2	0	9.2
23	0	0	7.0	0	0.6	0	7.6	7.6	0	0.5	0	1.5	0	9.6
24	4.0	0	S	0	0.2	0	4.2	4.5	0	0.5	S	5.0	0	10.0
25	0	0	0.1	0	0.2	0	0.3	0	0	0.3	0	0	9.7	10.0
26	0	0	3.0	0	0	6.8	9.8	0	0	0	0	0	9.6	9.6
27	2.5	0	0	0	0.8	0	3.3	0.5	0.1	0.3	0	1.0	3.0	4.9
28	2.0	0	0	0	4.5	0	6.5	8.5	0	0	0	1.0	0	9.5
29	9.9	0	0	0	0	0	9.9	0	0	6.0	0	0	4.0	10.0
30	0	0	0.3	0	9.0	0	9.3	0	0	0.8	0	0	9.2	10.0
	2.1	0.0	1.4	0.0	1.7	0.6	5.8	1.7	0.4	1.2	0.0	0.7	3.9	7.9

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	0	0	0	9.0	9.0	Ozone papers not yet received.	Ozone papers not yet received.	N N E	N N E	0.88
10.0	0	0	0	0	0	10.0			Variable	N [ble	3.78
0	0	0	0	0	10.0	10.0			S W	Cm. or varia-	0.35
2.0	0	0	0	0	8.0	10.0			N	N N W Calm	2.38
6.0	0	0	0	0.4	0	6.4			W	S W	0.44
0	0	0	0	0	0	0.0			N N W	N N W	1.14
0	0	0	0	0	0	0			W N W	N W	2.11
0	0	0	0	9.0	0	9.0			Variable	Calm	1.41
1.0	0	0	0	9.0	0	10.0			N N E	Variable	2.82
0	0	0	0	0	10.0	10.0			N W	N	3.08
0	0	0	0	5.0	0	5.0			S S W	None	0.62
0	0	0	0	5.0	0	5.0			W	None	1.76
0	0	0	0	9.6	0	9.6			......	......	0
0	0	0	0	7.0	0	7.0			W	Variable	3.87
0	0	3.0	0	0	0	3.0			S S E	None	1.41
0.3	0	9.7	0	0	0	10.0			E by N	N E	2.90
0	0	0	0	0	10.0	10.0			S W	Calm or N E	1.41
0.8	0	8.7	0	0	0	9.5			N N E	Variable	0.62
0	0	0	0	0	10.0	10.0			Variable	Calm	0.70
0.3	0	0	0	S	0	0.3			S E by S	E by N	4.49
0	0	0	0	0.5	0	0.5			E	E	5.54
0	0	0	0	0	10.0	10.0			E	E by N	6.95
1.5	0	0	0	0.1	0	1.6			E N E	S E	7.92
3.0	0	4.0	0	2.5	0	9.5			E	?	3.43
0	0	0.2	0	9.8	0	10.0			E S E	E N E	6.95
0	0	0	0	0	0	0			N E by N	E by N	4.75
S	0	0	0	0	0	0.0			E N E	E N E	6.51
9.0	0	0	0	0	0	9.0			E	E N E	2.64
0	0	0	0	0	10.0	10.0			S W	None	0.62
0	0	0	0	0	10.0	10.0			N	N N E	3.78
1 2	0.0	0.9	0.0	2.1	3.1	7.3			......	......	2.94

Gangaroowa near Kandy, Ceylon.

November, 1863.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	W N W	Calm	2.29	S S W (?)	Calm	0.00
2	N N W	N W	7.04	N W by N	None	1.14
3	E N E	N	1.50	N	None	1.23
4	W	Calm	2.82	Calm	W by S	0.00
5	S S W	W	2.90	N W by N	Calm	0.44
6	S W by W	W S W	1.14	?	None	?
7	W N W	Calm (?)	3.52	......	......	0
8	W	Calm	4.05	Calm	?	0.00
9	W N W	?	2.64	Calm	Calm	0.00
10	N W by W	N E by E	2.99	N W by N	?	0.09
11	N W by W	N E and Calm (?)	2.38	N by E	?	4.40
12	W N W	Calm	4.22	Calm	N E (?)	0.00
13	......	......	0	N W	?	0.26
14	N W	Calm	3.34	N	?	1.50
15	W N W	N E	3.52	N W	None	0.53
16	S S W	N (?) Calm (?)	0.09	N N E	None	3.26
17	W S W	W	4.14	Calm	W S W	0.00
18	S S E	Calm	3.96	N N E	None	1.41
19	S	S W by (?)	2.82	W S W	?	0.00
20	E	E N E	4.22	N E by E	None	2.38
21	W by S	S S E, E N E & Calm	0	Calm	E	0.00
22	N by E	E by N & Calm	3.70	N E	?	5.46
23	E N E	E N E (?)	6.25	N E	Calm (?)	2.55
24	W N W	Calm	2.55	N by (?)	E	0.00
25	S S W	N N E & Calm	0.00	Calm	E N E	0.00
26	E N E	E & Calm	4.40	N N E	None	0
27	N E	E N E	3.78	E N E	None	2.64
28	E N E	N E	0.62	Variable	None	0.44
29	W N W	E by N	0.79	N	N E	0.44
30	E by N	N N E	1.50	N N E	?	2.38
	......	......	2.97	......	......	1.13

Gangaroowa near Kandy, Ceylon.

Distance in Miles in 24 Hours.	Lightning and Thunder.
20.86	In after even L & Th. dist. to N & L R to E S E—S E.
21.81	Th. in after noon & fore even ; L R to W N W in after even.
31.41	Th. in after noon L & Th. dist. in fore even.
27.81	
22.10	L R to S S E at 10 P. M.
21.19	
49.72	
25.39	L R to S E in after even, early.
24.19	L R to S E in after even, early.
25.76	L R to S E in after even, early.
28.21	L R to S E in early after even.
29.58	
25.95	L R to S all after even.
22.98	L R to S all after even.
21.55	In fore even L & Th. to W—W S W dist. 5 to 12 Miles.
28.94	
30.77	In after noon & early fore even. L & Th. a few miles away & 1 lattr. dist. [to N E—E N E.
22.01	In fore even. L & Th. 7 or 8 miles dist.
39.78	L R to W N W—N W in early after even.
35.12	
68.16	
84.37	L to S W in early after even.
36.78	
43.41	
53.81	L R to W S W in after even.
66.32	
57.54	L R to S W in early after even.
34.84	
47.74	
34.94	

Gangaroowa near Kandy, Ceylon.

November, 1863.	GENERAL REMARKS.
1	Fine and pleasant till 3 P. M.; very sultry and oppressive after.
2	Fine till noon; heavy nimb. and rain after morn and fore even, then fine.
3	Fine till noon; after, heavy nimb. and rain which in fore even, heavy.
4	Fine till noon; after, heavy nimb. but only light rain.
5	Fine after morn then cloudy with nimb. and showery.
6	Fine, dry and pleasant day.
7	Fine, dry and pleasant day.
8	Fine, dry and pleasant day.
9	Fine, dry and pleasant day.
10	Fine, dry and pleasant till even, then sultry; cloudy and some rain.
11	Cool at morn, fine, mild to hot, dry and fresh day.
12	Fog at morn, fine, mild to hot, dry and fresh day.
13	Cool and fresh at morn, fine, mild to hot, dry and fresh day.
14	Fine, warm to very hot and dry but pleasant till 6 P. M.; then sultry.
15	Fog at morn, fine, mild to hot, dry and fresh day.
16	Fine till noon; after, heavy nimb. and rain.
17	Fine till noon; nimb. and heavy rain in after noon fore and after even.
18	Fine but dull till noon; after, the same as above.
19	Fine till noon; after, heavy nimb. and rain.
20	Fine till noon; nimb. and light rain in after noon and fore even.
21	Fine, fresh day; light shower at 4 P. M.
22	Fine, fresh day; light shower at 4 P. M.
23	Fine, mild to very warm, dry and fresh day.
24	Fine, dry & fresh till noon; sultry in after noon, heavy nimb. & rain to S. E.
25	Fine till noon; after, nimb. and light rain.
26	Dull cloudy day; light rain in after noon, fore and after even.
27	Fine till noon & in fore & after even; in after noon nimb. & light rain.
28	Fine till noon & in fore & after even; in after noon nimb. & light rain.
29	Fine till 3 P. M. then heavy threatening nimb. and a few drops of rain.
30	Dull after morn, low nimb. and incessant light rain after 11 o'clock.

Meteorological Observations taken at Gangaroowa near Kandy, Ceylon, in the month of December, 1863.

Alt. 1560 ft.; E. Long. 80° 37′, N. Lat. 7° 17′.

All the Instruments (excepting the Max. for the Air, and Min. for the Grass) have been compared with standards.

The tension of aqueous vapour, from which are deduced the pressure of dry air, the dew point and humidity, has been found by the formula $f = f' - \frac{d}{88} \times \frac{h}{30}$ given in Mr. Drew's "Practical Meteorology," (Ed. 1855) and the tables therein given.

The dew is the weight in grains deposited on a square foot of ordinary woollen cloth exposed on a board from 6 P. M. to 6 A. M. or for as many hours as there is no rain.

The rain guage is $4\frac{1}{2}$ feet above the ground.

The ozone cage is hung about 25 feet above the ground.

The direction of the wind given is that of the lowest current by the vane, and of the currents above this by the direction in which the Nimbi and Cumulo-Strati clouds are moving.

In this column a "calm" signifies that the clouds are apparently motionless: "variable," that the clouds apparently in the same or nearly the same stratum move in no fixed direction, but their parts move as if in vortices, or different masses of them move up from different quarters as if into a vast vortex, this being nearly always the case before thunder storms.

Entries, such as W S W and N N W or $\frac{\text{W S W}}{\text{N N W and calm,}}$ signify that the clouds are evidently in strata of different altitudes, that those in the lowest stratum move from W S W; those in the next higher from N N W; those in the next are apparently becalmed, and so on.

The velocity and distance in 24 hours are given by Robinson's Anemometer.

In the column for Lightning and Thunder.

L = "Lightning" when the flash is near enough to be visible.

L R = "Lightning Reflection" when the flash is so distant that only its reflection on the clouds or in the air is visible.

"Morn," is 6 A. M., "Even," 6 P. M. and "Night," 12 P. M. and "fore" and "after" are prefixed to these, as ordinarily to "Noon," to denote the 3 previous and 3 following hours.

R. H. Barnes.

Gangaroowa near Kandy, Ceylon.

December, 1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.			Dew Point.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
1	28.300	28.191	28.292	27.601	27.436	27.568	71.0	73.0	70.6	68.8	71.1	69.9
2	.310	.228	.373	.545	.457	.701	74.0	74.1	68.5	71.6	71.8	67.6
3	.389	.273	.371	.688	.480	.723	72.4	75.1	69.2	68.9	72.7	66.5
4	.370	.252	.385	.640	.458	.648	74.9	77.1	72.0	70.1	72.7	70.4
5	.393	.283	.403	.676	.493	.708	71.6	74.7	69.5	69.6	72.6	68.6
6	.371	.253	.341	.642	.547	.676	75.0	75.5	72.0	70.1	69.1	67.3
7	.384	.271	.378	.651	.532	.703	75.0	73.1	69.2	70.2	70.5	67.7
8	.410	.323	.377	.674	.614	.688	74.4	72.3	70.1	70.4	69.3	68.3
9	.412	.299	.420	.737	.563	.725	73.3	73.7	70.1	67.7	70.4	68.6
10	.410	.297	.397	.698	.577	.755	74.0	75.2	70.1	69.3	69.7	66.2
11	.396	.279	.384	.773	.618	.801	73.4	75.2	70.5	65.3	67.1	63.3
12	.410	.307	.413	.825	.659	.853	73.9	76.7	70.3	63.4	66.5	62.0
13	.424	.312	.415	.883	.694	.858	73.8	76.7	71.2	61.0	65.1	61.9
14	.409	.295	.384	.809	.625	.754	74.3	76.9	71.5	64.2	67.5	65.6
15	.401	.264	.384	.725	.655	.745	73.2	77.6	70.1	67.8	64.6	66.0
16	.393	.271	.374	.754	.580	.778	74.7	75.3	69.0	66.1	68.4	64.0
17	.375	.283	.377	.695	.586	.708	73.4	73.4	70.1	68.0	68.7	67.5
18	.372	.280	.401	.699	.601	.772	75.0	78.4	71.0	67.6	67.9	65.6
19	.406	.292	.406	.811	.716	.778	74.5	77.8	72.0	63.9	62.9	65.5
20	.415	.291	.409	.789	.678	.805	75.3	79.4	71.5	65.4	64.8	64.4
21	.412	.325	.426	.768	.608	.741	75.8	75.8	70.5	66.3	69.6	68.2
22	.421	.312	.416	.715	.579	.779	72.0	73.7	67.9	69.1	70.2	65.9
23	.423	.304	.391	.823	.708	.867	73.1	75.3	70.2	64.1	64.0	60.1
24	.414	.287	.400	.879	.692	.851	73.8	76.7	69.9	60.7	63.9	61.4
25	.381	.243	.378	.723	.646	.764	73.6	78.4	70.0	66.9	64.0	64.8
26	.366	.248	.348	.694	.506	.625	73.5	73.8	70.7	67.6	70.6	69.8
27	.373	.249	.347	.687	.553	.708	70.7	73.9	71.9	68.2	68.6	66.1
28	.352	.276	.364	.736	.584	.690	71.0	73.0	69.6	64.9	68.5	67.7
29	.373	.269	.390	.670	.542	.713	71.9	71.9	69.0	69.0	70.0	67.8
30	.376	.268	.376	.728	.602	.725	73.3	74.1	69.6	66.5	67.3	66.6
31	,,	,,	.363	,,	,,	.736	,,	,,	70.3	,,	,,	65.5
	28.388	28.278	28.383	27.725	27.586	27.740	73.5	75.3	70.3	67.1	68.3	66.2

Gangaroowa near Kandy, Ceylon.

Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in Air.	Minimum in Air.	Difference.	Mean.	Dew.	Rain.		
A. M. 9.30	P. M. 3.30	P. M. 10.0								A. M. 9.30	P. M. 10.0	Total.
931	942	977	116.3	66.2	74.6	67.7	6.9	71.2	0	0.101	0.512	0.613
925	930	971	91.9	68.2	76.6	69.0	7.6	72.8	0	0.116	1.554	1.670
892	926	915	120.2	,,	76.4	65.5	10.9	70.9	200	0.000	0.170	0.170
858	869	949	119.2	62.4	77.9	65.5	12.4	71.7	273	0.000	0.004	0.004
936	934	972	102.1	64.8	75.5	68.3	7.2	71.9	299	0.064	0.064	0.128
854	814	857	128.3	63.8	78.6	67.0	11.6	72.8	287	0.000	0.000	0.000
858	920	952	140.1	60.4	78.1	64.8	13.3	71.5	338	0.000	0.341	0.341
878	908	944	102.0	64.0	78.2	66.8	11.4	72.5	160	0.000	0.636	0.636
834	899	954	135.0	65.6	76.8	67.8	9.0	72.3	296	0.000	0.336	0.336
859	838	880	130.7	64.2	77.0	68.0	9.0	72.5	192	0.000	0.000	0.000
768	769	790	137.0	62.0	77.1	67.6	9.5	72.3	252	0.000	0.000	0.000
709	719	735	134.0	57.2	77.5	64.5	13.0	71.0	218	0.000	0.000	0.000
659	686	737	134.7	54.0	77.6	60.6	17.0	69.1	213	0.000	0.000	0.000
716	739	826	131.0	57.3	78.0	62.9	15.1	70.5	260	0.000	0.031	0.031
838	656	876	127.5	60.5	77.5	66.3	11.2	71.9	185	0.000	0.021	0.021
756	801	847	126.7	62.6	77.5	66.5	11.0	72.0	162	0.000	0.008	0.008
838	859	917	121.6	62.8	76.3	66.5	9.8	71.4	135	0.000	0.027	0.027
788	713	838	129.8	64.2	78.7	67.6	11.1	73.1	242	0.000	0.000	0.000
708	617	809	123.5	62.6	78.0	66.3	11.7	72.2	179	0.000	0.000	0.000
726	624	791	133.6	63.2	79.7	67.5	12.2	73.6	188	0.000	0.000	0.000
735	816	926	118.3	56.1	77.3	62.9	14.4	70.1	178	0.000	0.058	0.058
939	895	938	91.6	67.1	74.8	68.7	6.1	71.7	0	0.028	0.180	0.208
747	691	716	119.9	58.2	76.4	63.9	12.5	70.2	220	0.000	0.000	0.000
651	659	757	,,	59.7	77.7	67.8	9.9	72.7	113	0.000	0.000	0.000
806	627	845	124.3	58.5	78.2	65.3	12.9	71.8	178	0.000	0.000	0.000
826	904	972	105.0	64.2	75.5	68.4	7.1	71.9	84	0.000	0.948	0.948
922	844	826	108.8	67.2	74.5	68.0	6.5	71.3	0	1.133	0.003	1.136
821	863	936	88.4	66.0	73.2	68.5	4.7	70.8	28	0.023	0.018	0.041
909	941	962	89.5	66.6	73.8	67.8	6.0	70.8	0	0.062	0.364	0.426
801	803	907	131.0	64.7	76.6	67.7	8.9	72.2	0	0.000	0.000	0.000
,,	,,	854	,,	63.4	76.2	66.0	10.2	71.1	123	0.000	0.120	0.120
816	806	877	119.4	62.6	76.8	66.5	10.3	71.7	5003	1.527	5.395	6.922

Gangaroowa near Kandy, Ceylon.

	A. M. 9.30							P. M. 3.30						
December, 1863.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.
1	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
2	0	0	5.8	0	0	4.0	9.8	0	0	0	0	0	10.0	10.0
3	0.3	0	0.1	0	9.4	0	9.8	0	0	1.0	0	0	9.0	10.0
4	0.8	0	0	0	0.6	0	1.4	0	6.0	0	0	0	4.0	10.0
5	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
6	4.0	0	0.8	0	1.0	0	5.8	0	8.4	0	0	0	1.4	9.8
7	5.7	0	0.3	0	2.5	0	8.5	0	7.9	0	0	0	2.0	9.9
8	0	0	9.5	0	0.3	0	9.8	0	0.1	0.2	0	0	9.4	9.7
9	2.5	0	5.0	0	0.1	0	7.6	0	0.5	0	0	0	9.5	10.0
10	0.2	0	0	0	6.5	0	6.7	0	3.0	0	0	0	6.5	9.5
11	0	8.4	1.2	0	0.1	0	9.6	0	6.4	2.0	0	1.0	0	9.4
12	0.1	0	0	0	S	0	0.1	0.1	0	0	0	2.5	0	2.6
13	0	0	0	0	0	0	0.0	0	0	0	0	3.5	0	3.5
14	0	0	0	0	3.3	0	3.3	0	0	0	0	5.0	0	5.0
15	0	0	0	0	7.0	0	7.0	6.4	0	0.4	0	1.2	0	8.0
16	0.2	0	0	0	2.5	0	2.7	0	0.2	0	0	0	9.6	9.8
17	0	0	4.0	0	1.5	0	5.5	0	0	0.1	0	0	9.9	10.0
18	7.0	0	0.5	0	0.5	0	8.0	2.0	0	0.3	0.2	0.8	0	3.3
19	0.8	0	0.1	0	4.0	0	4.9	0.7	0	0	0	0.6	0	1.3
20	0.5	0	0.1	0	0.3	0	0.9	0	0	0	0.1	0.8	0	0.9
21	0	0	0	0	2.5	0	2.5	0	0.3	0	0	0	9.7	10.0
22	0	0	0	0	0	10.0	10.0	6.5	0	1.5	0	1.0	0	9.0
23	0.5	0	0	0	1.7	0	2.2	6.3	0	0	0	3.3	0	9.6
24	0	0	0	0	0.2	0	0.2	S	0	0	0	1.0	0	1.0
25	7.0	0	0	0	3.0	0	10.0	8.0	0	0	0	0.5	0	8.5
26	0	0	S	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
27	0	0	2.5	0	0	7.5	10.0	0	0	3.5	0	0	6.5	10.0
28	0	0	0	0	0	10.0	10.0	0	0	0	0	0	10.0	10.0
29	0	0	5.7	0	1.3	3.0	10.0	0	0	3.0	0	0	7.0	10.0
30	8.2	0	0.6	0	0.2	0	9.0	0	0.1	0	0	0	9.9	10 0
31	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1.3	0.3	1.2	0.0	1.6	2.1	6.5	1.0	1.1	0.4	0.0	0.7	4.8	8.0

Gangaroowa near Kandy, Ceylon.

P. M. 10.0							Ozone.		9.30 A.M. Direction of wind.		Velocity in feet per Second.
Cirrus.	Cirro-Stratus.	Cirro-Cumulus.	Cumulus.	Cumulo-Stratus.	Nimbus & Stratus.	Total.	6 A. M.	6 P. M.	Vane.	Lower Clouds.	
0	0	0	0	0	10.0	10.0	Ozone papers not yet received.	Ozone papers not yet received.	S W	S S W	0.88
0	0	0	0	1.0	0	1.0			W by S	N N W	1.85
3.5	0	0	0	0	0	3.5			S	Variable	0.18
0	0	0	0	0	10.0	10.0			N N E	E	4.58
8.7	0	0	0	1.3	0	10.0			N W by W	Calm	1.94
0	0	0	0	0	0	0			E by S	E by S	6.25
9.7	0	0	0	0	0	9.7			Variable	E by S	2.20
0	0	0	0	0	10.0	10.0			W S W	E N E	6.07
0	0	0	0	0	8.0	8.0			N E	?	5.90
0	0	0	0	1.0	0	1.0			N N E	E N E	9.50
0.2	0	0	0	0	0	0.2			E N E	E N E	8.80
0	0	0	0	0	0	0.0			E N E	None	7.66
0	0	0	0	0.1	0	0.1			E	Calm	4.93
0	0	0	0	0	9.7	9.7			E	N E	11.79
0	0	3.0	0	0	9.0	9.0			Variable	E N E	2.73
1.5	0	0	0	0.4	0	1.9			E	E N E	9.33
0.2	0	0.5	0	9.0	0	9.7			N N E	E by N	5.37
3.3	0	0	0	0.2	0	3.5			E by N	E N E	8.71
0	0	0	0	10.0	0	10.0			E	N E	5.11
0	0	0	0	0.2	0	0.0			E	E N E	4.58
0	0	0	0	0	10.0	10.0			E N E	E by N	6.07
0.3	0	0	0	9.3	0	9.6			N E	N E by N	2.82
0	0	0	0	0	0	0			E N E	E N E	6.16
6.6	0	0	0	0.1	0	6.7			E N E	E N E ?	8.00
0	0	3.3	0	0	0	3.3			E S E	E N E	1.76
0	0	0	0	0	10.0	10.0			N N E	E N E	8.45
0	0	9.9	0	0.1	0	10.0			N N E	N E	6.69
0.4	0	9.0	0	0	0.6	10.0			E N E	E N E ?	17.25
0	0	0	0	0	10.0	10.0			N N E	E N E	6.42
0	0	0	0	0	0	0			E N E	E N E	6.51
1.0	0	0	0	0	0	1.0			......	......	
1.2	0.0	0.8	0.0	1.2	3.2	6.4			......	......	5.95

Gangaroowa near Kandy, Ceylon.

December, 1863.	3.30 P. M. Direction of wind.		Velocity in feet per Second.	10.0 P. M. Direction of wind.		Velocity in feet per Second.
	Vane.	Lower Clouds.		Vane.	Lower Clouds.	
1	N W	N N W	0.88	Calm	?	0.00
2	W N W	W S W	4.40	N N W	?	2.29
3	N W	Calm	0.18	S	None	0.09
4	S S W	Calm	3.52	W N W	?	0
5	N by W	E	1.58	N by E	?	0.00
6	E N E	S E & Calm	3.61	W	?	0.44
7	S W by S	S E (?)	0.18	Calm	None	0.00
8	E by S	Calm	0.35	Variable	?	0.09
9	W N W	Calm	1.14	N E	E N E	5.90
10	N	Calm	5.19	N E	Calm (?)	5.28
11	N E	Calm	5.28	E	None	8.54
12	N W by W	Calm (?)	2.73	N E by E	None	6.34
13	N W by N	E by N	2.46	E N E	Calm	3.08
14	N E	N E	4.22	E N E	N E (?)	2.02
15	E by N	E by N	8.89	N E by E	N E	0.44
16	S S W	N E by E	0.53	N by W	?	6.78
17	E N E	N E	3.26	N	E N E	3.34
18	E S E	E N E	7.22	?	E N E	11.97
19	E N E	E N E	5.19	N E	N E	2.61
20	E	E by N Calm (?)	7.22	E by S	?	4.31
21	N E	E N E & Calm	3.08	N N E	?	3.70
22	N E	E N E	2.38	N E by N	E by N	0.62
23	N N E	E by N	9.06	E N E	E N E (?)	9.42
24	N E	E N E	2.55	E S E	?	3.87
25	N E by E	E N E	10.21	N E by N	Nono	4.22
26	S E by E	N	1.58	Calm	N by E	0.00
27	E	E N E	3.17	E N E	E N E (?)	4.75
28	E	E N E	4.14	N N E	N E	4.66
29	N	E N E	5.02	N by E	?	2.82
30	E S E	N E	1.41	N E	?	3.78
31	......	......	0	E N E	Nono	6.51
	......	......	3.69	......	......	3.60

Gangaroowa near Kandy, Ceylon.

Distance in Miles in 24 Hours.	Lightning and Thunder.
12.13	
31.10	
18.36	In fore even L & Th. not far, L R to S W in after even.
27.51	In after noon Th. & in after even L & Th. distant to N W & L R.
16.64	In foro oven Th.
46.78	In after noon Th.
33.77	In after noon & in fore even Th.
46.04	In after noon L & Th. not far distant.
60.86	In foro even Th. In after even L R to S W.
74.61	In after even L R to S W & S by W.
97.59	
92.68	
72.70	
65.48	In after even L R in (? ?) quarter.
67.61	
79.62	
82.80	
105.42	In after even L R to S S W.
96.89	
86.44	In after even L R to S W.
62.37	
39.94	
79.12	
104.58	
93.18	
57.26	
50.93	
101.28	
60.11	In after even L R to S S W.
78.84	In after even L. R. to S by W.
87.80	
65.50	

Gangaroowa near Kandy, Ceylon.

December, 1863.	GENERAL REMARKS.
1	Mild to rain and very damp, light rain nearly all day.
2	Mild to rain and very damp, light rain nearly all day.
3	Fog till 7 A. M.; cloudy, damp and muggy or raw; rain fore and after noon.
4	Fog till 7.30 A. M.; fine till noon; after nimb gather. & light rain in fore even.
5	Light rain till 11 A. M. & at even; heavy nimb; at 2 P. M. and after.
6	Fine & fresh till noon; after threatening nimb: but no rain.
7	Fine & fresh till noon; after threatening nimb: rain after noon & after even.
8	Fine & fresh till noon; after threatening nimb. rain after noon & after even.
9	Dull and cloudy with nimb, rain fore and after noon.
10	Fine but cloudy, mild to warm and pleasant day.
11	Fine, mild to warm, dry and fresh day.
12	Fine, mild to warm, dry and fresh day.
13	Fine, mild to warm, dry and fresh day.
14	Fine, dry & fresh till noon; cloudy after and shower at 4.20 P. M.
15	Fine, dry & fresh till near even; then cloudy with nimb. & light rain between
16	Fine, dry & fresh till noon; then cloudy & light rain in fore even. [4 & 7 o'clock.
17	Fine till noon & in after even; cloudy after noon & fore even; light rain at 3 P.M.
18	Mild to warm, dry & fresh day.
19	Fine, cool to warm, dry and fresh day.
20	Fine, mild to hot, dry and fresh day.
21	Fine till noon; then cloudy with nimb. and light rain.
22	Dull, cloudy and damp nearly all day; light showers.
23	Fine, mild to warm, dry and fresh day.
24	Fine, mild to warm, dry and fresh day.
25	Cool at morn; and later after even; fine, warm to hot, dry and fresh.
26	Cloudy & damp showers fore & after noon, continual rain fore & after even.
27	Cloudy & very damp all day; continual rain till 9 A. M.
28	Cloudy, raw & damp all day; light rain at intervals.
29	Cloudy, raw & damp all day; showers all day. [rain.
30	Fine, mild to warm and pleasant nimb: in after noon and fore even but no
31	Cool at morn, & after even, nimb. in after morn & again after noon & fore even.
	Solar Halos on 5th, 11th, 21st and 30th.

Summary of the Meteorological Observations taken at Gangaroowa near Kandy in the year, 1863.

WIND.

Number of days on which it blew in certain directions.

By the Vane.

A. M. 9.30.

1863.	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.
January, ...	2	9	13	2	1	2	1	1	0	0
February, ...	1	4	8	5	3	0	2	3	1	1
March, ...	3	3	2	3	5	7	7	0	1	0
April, ...	1	1	0	3	5	9	7	1	2	1
May, ...	0	0	0	0	3	15	9	1	2	1
June, ...	0	0	0	0	0	13	17	0	0	0
July, ...	0	0	0	0	1	11	18	0	0	1
August, ...	0	0	0	0	4	15	11	0	0	1
September,... ...	0	0	0	0	0	20	9	0	0	1
October, ...	0	0	0	1	0	14	14	0	0	2
November, ...	5	3	6	2	1	3	4	2	3	1
December, ...	6	9	8	0	1	2	1	1	2	1
	18	29	37	16	24	111	100	9	11	10

P. M. 3.30.

1863.	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.
January, ...	2	11	7	2	0	0	6	3	0	0
February, ...	4	4	8	5	1	1	3	0	1	1
March, ...	2	3	2	0	0	5	10	8	1	0
April, ...	0	1	0	1	3	3	19	1	0	2
May, ...	0	0	0	0	0	8	16	3	3	1
June, ...	0	0	0	0	0	11	19	0	0	0
July, ...	0	0	1	0	1	13	15	0	0	1
August, ...	0	0	0	0	0	6	23	1	0	1
September,... ...	0	0	0	0	2	15	13	0	0	0
October, ...	1	0	0	0	1	10	15	1	0	3
November, ...	1	5	2	1	4	2	10	4	0	1
December, ...	4	9	7	1	2	1	2	4	0	1
	14	33	27	10	14	75	151	25	5	11

P. M. 10.0.

1863.	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.
January, ...	7	14	5	1	0	1	1	1	1	0
February, ...	2	6	13	1	1	0	1	0	4	0
March, ...	0	0	1	2	3	7	2	6	9	1
April, ...	7	1	0	1	0	1	3	10	5	2
May, ...	1	0	0	0	2	7	16	1	4	0
June, ...	1	0	0	0	1	11	15	1	1	0
July, ...	1	0	0	1	1	11	17	0	0	0
August, ...	1	0	0	1	0	8	16	4	1	0
September,... ...	1	0	1	0	0	6	16	5	1	0
October, ...	1	0	0	0	0	8	12	9	1	0
November, ...	9	4	0	0	1	1	0	5	8	2
December, ...	6	13	3	0	1	0	2	1	4	1
	37	38	23	7	10	61	101	43	39	6

By Vane.

The wind blew. No. of Days.	9.30	3.30	10.0	Total.
Along Meridian N or S......	42	28	47	117
East of ditto, ...	82	70	68	220
West of ditto,.................	220	251	205	676
Calms and Variables, ...	11	5	39	55
Missed, ...	10	11	6	27
	365	365	365	1095

WIND.

Number of days on which it blew in certain directions.

By the Lower Clouds.

1863.	A. M. 9.30.										P. M. 3.30.										P. M. 10.0.									
	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.	N	N E	E	S E	S	S W	W	N W	Calms.	Missed.
January, ...	1	4	12	0	0	0	0	1	4	9	1	7	6	1	0	0	3	0	8	5	0	1	3	0	1	0	1	0	1	24
February, ...	0	5	5	0	0	0	0	1	2	15	2	9	8	0	0	1	0	0	3	5	0	2	3	1	0	0	0	0	0	22
March, ...	0	1	4	0	0	2	1	0	13	10	0	3	3	1	0	0	0	2	18	4	0	0	3	0	0	2	1	0	6	19
April, ...	0	0	2	1	1	3	1	0	9	13	0	1	1	0	0	5	9	0	9	5	0	0	0	0	0	2	0	0	3	25
May, ...	0	0	0	0	1	23	3	0	2	2	0	0	0	0	0	20	7	0	2	2	0	0	0	0	0	8	3	0	2	18
June, ...	0	0	0	0	0	21	8	0	1	0	0	0	0	0	0	15	11	0	4	0	0	0	0	0	0	5	14	0	3	8
July, ...	0	0	0	0	1	21	6	0	1	2	0	0	0	0	0	18	7	0	5	1	0	0	0	0	1	10	9	0	0	11
August, ...	0	0	0	0	2	17	5	0	0	7	0	1	0	0	2	14	5	0	8	1	0	0	0	0	1	9	5	0	4	12
September, ...	0	0	0	0	0	27	2	0	0	1	0	0	0	0	0	23	6	0	1	0	0	0	1	0	0	9	4	0	0	16
October, ...	0	0	0	0	4	19	2	0	3	3	0	0	0	1	1	11	3	1	12	2	0	0	0	0	1	9	0	0	3	18
November, ...	4	4	4	0	0	1	0	2	9	6	2	5	1	0	0	1	2	1	16	2	0	3	2	0	0	1	1	0	4	19
December, ...	0	18	5	0	1	0	0	1	3	3	1	12	4	0	0	1	0	1	11	1	1	9	1	0	0	0	0	0	2	18
	5	32	32	1	10	134	28	5	47	71	6	38	23	3	3	109	53	5	97	28	1	15	13	1	4	55	38	0	28	210

Lower Clouds.

	9.30	3.30	10.0	Total.
Along Meridian N or S	15	9	5	29
East of ditto, ...	65	64	29	158
West of ditto, ...	167	167	93	427
Calms and Variables, ...	47	97	28	172
Missed, ...	71	28	210	309
	365	365	365	1095

N. B.—Calms and variables are included in the same column.

The "Missed" days in the columns of "Lower Clouds" are in consequence mostly of there having been no lower clouds or, at 10 P. M., of its being too dark to see how they were moving.

Greatest distance in miles travelled by wind in 24 hours 138.63 July 1.

Least do. de. do. do. do. 2.95 Feb. 16.

1863.	Velocity in feet per Second.			Distance in miles in 24 hours.	No. of days on which			No. of days on which Halos seen.	
	A. M. 9.30.	P. M. 3.30.	P. M. 10.0.		Lightning seen and its Thunder heard.	Only Thunder heard.	Only Lightning seen.	Solar.	Lunar.
January, ...	3.32	2.91	2.53	34.05	6	0	5	?	?
February, ...	2.04	2.47	1.72	28.53	2	2	5	?	?
March, ...	0.98	1.93	0.22	15.00	18	15	14	3	0
April, ...	1.96	5.09	0.70	33.57	16	10	15	1	2
May, ...	4.98	5.60	1.73	54.70	1	11	6	1	2
June, ...	6.20	5.80	2.49	67.48	0	6	1	3	0
July, ...	6.70	7.11	3.86	84.99	0	3	2	1	2
August, ...	5.64	5.65	2.29	67.97	4	9	8	3	2
September, ...	6.90	8.09	2.57	81.13	0	0	0	6	4
October, ...	4.99	5.43	1.91	49.83	4	9	15	6	1
November, ...	2.94	2.97	1.13	34.94	5	1	13	6	0
December, ...	5.95	3.69	3.60	65.50	3	5	9	4	0
	4.38	4.73	2.06	51.47	59	71	93	34	13

1863.	Barometer reduced to 32°.			Pressure of Dry Air.			Thermometer.		
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0
January, ...	28.417	28.305	28.400	27.742	27.597	27.739	73.5	75.5	71.5
February, ...	.358	.244	.348	.711	.561	.701	73.5	77.0	71.6
March, ...	.359	.239	.353	.634	.484	.631	75.6	77.8	71.9
April, ...	.299	.189	.296	.553	.378	.557	76.2	79.7	72.1
May, ...	.300	.200	.292	.537	.402	.555	76.7	78.7	73.2
June, ...	.303	.218	.303	.545	.439	.600	75.3	76.5	72.0
July, ...	.294	.214	.297	.554	.451	.609	73.8	75.2	71.1
August, ...	.318	.224	.319	.596	.453	.625	74.5	76.7	71.6
September, ...	.341	.237	.334	.633	.503	.680	74.3	76.1	70.5
October, ...	.349	.234	.341	.630	.489	.650	74.6	76.7	70.9
November, ...	.365	.253	.363	.670	.515	.678	75.2	76.9	70.9
December, ...	.388	.278	.383	.725	.586	.740	73.5	75.3	70.3
Means and Totals,	28.341	28.236	28.336	27.628	27.488	27 647	74.7	76.6	71.5

Barometer.

9.30 A. M. Max. 28.475 Jan. 22. Min. 28.233 Apr. 21, range 0.242
3.30 P. M. do. 28.365 Jan. 19. do. 28.119 Apr. 18, do. 0.246 } Extreme range 0.356.
10.0 P. M. do. 28 455 Jan. 19. do. 28.204 May 12. do. 0.251

Thermometer.

Highest Max. 85.0 May 2. Lowest Max. 73.2 Dec. 28, range 11.8
Do. Min. 73.2 May 12. Do. Min. 54.4 Jan. 19, do. 18.8 } Extreme range 30.6.

Highest in Sun's rays at 12 o'clock 148.7 March 2.
Lowest Min. on the grass 47.6 Jan. 19.
Rain greatest fall in 24 hours 10 P. M. to 10 P. M 4.126 in. Oct. 19.
Dew 54.358 grains equivalent to 1.493 in. in depth.

1863.	Dew Point.			Humidity.			In Sun's Rays at 12 o'clock.	Minimum on the Grass.	Maximum in the Air.	Minimum in the Air.	Difference.	Mean.	Ozone.
	A. M. 9.30	P. M. 3.30	P. M. 10.0	A. M. 9.30	P. M. 3.30	P. M. 10.0							
January, ...	67 6	69.0	67.0	836	807	865	,,	62.6	77.0	66.1	10.9	71 6	2.7
February, ...	66.3	67.9	66.4	795	753	818	126.5	62.3	77.9	66.7	11.2	72 3	1.9
March, ...	69.9	71.1	69.8	832	812	936	131.1	64.0	80.2	67.4	12.8	73.8	2.5
April, ...	70.8	73.3	70.5	842	819	948	131.3	64.5	81.1	67.4	13.7	74.2	2.6
May, ...	71.4	72.8	70.3	818	833	912	118.8	67.2	80.2	70.1	10.1	75.1	3.8
June, ...	71.3	72.1	69.0	880	872	906	111.0	67.1	78.0	69.8	8.2	73.9	2.9
July, ...	70.5	71.4	68.3	900	888	912	105.6	66.4	76.8	69.1	7.7	73.0	3.5
August, ...	69.8	71.8	68.5	861	856	905	116.1	65.2	78.0	68.6	9.5	73 3	2.7
September, ...	69.2	70.2	66.7	848	832	886	115.5	64.2	77.5	68.0	9.5	72.7	1.4
October, ...	69.6	70.7	68.4	854	828	923	117.8	64.2	78.3	67.4	10.9	72.8	,,
November, ...	68.5	70.4	68.1	808	815	917	128.4	62.1	78.6	66.4	12.2	72.5	,,
December, ...	67.1	68.3	66.2	816	806	877	119.4	62.6	76.8	66.5	10 3	71.7	,,
Means and Totals,	69.3	70.7	68.3	843	827	903	118.5	64.4	78.4	67.8	10.6	73.1	2.7

Greatest observed difference between Temperature and Dew Point 19.°6 $\left\{ 74.°1 — 54.°5 \right\}$ on 5th February 3.30 P. M. Corresponding humidity 524.

Gangaroowa altitude above sea 1560 ft. E. Long. 80° 37′.
N. Lat. 7° 17′.

1863.	Rain.				Cloud.			Dew.	
	A. M. 9.30	P. M. 10.0	Total.	No. of Days.	A. M. 9.30	P. M. 3.30	P. M. 10.0	Grains per square foot.	No. of Days.
January, ...	1.990	6.941	8.931	18	4.9	7.3	5.9	4212	21
February, ...	0.416	5.221	5.637	14	6.9	8.3	7.2	4345	23
March, ...	0.204	12.036	12.240	22	4.0	8.7	8.5	6438	24
April, ...	0.425	14.532	14.957	17	5.1	6.9	6.8	7886	25
May, ...	3.184	3.990	7.174	22	8.6	8.9	8.1	2691	13
June, ...	4.017	6.164	10.181	27	9.2	9.3	7.6	1817	15
July, ...	3.059	7.379	10.438	29	9.1	9.4	8.5	877	11
August, ...	2.712	2.871	5.583	22	8.9	9.6	9.7	2323	12
September, ...	0.527	2.388	2.915	20	9.2	8.7	7.3	4818	22
October, ...	4.447	5.042	9.489	23	7.5	8.0	7.8	6204	23
November, ...	0.180	7.509	7.689	17	5.8	7.9	7.3	7744	27
December, ...	1.527	5.395	6.922	19	6.5	8.0	6.4	5003	25
Means and Totals,	22.688	79.468	102.156	250	7.1	8.4	7.6	54358	241

R. H. BARNES.

JO

C

N

Edgar L.
Esq.
Gerard K

C. Hume.

Gerard Kr

Lieut. R. C

Capt. T. H

W. Th
Junior.

APPENDIX

TO THE

JOURNAL OF THE ASIATIC SOCIETY.

Classified List of Naturalists and others engaged in the Collection of Objects of Interest.

I.—Natural History Generally.

Name.	*Address.*	*Particulars.*
Edgar L. Layard, Esq.	Curator of Museum at Cape Town.	Would be glad to assist the Asiatic Society generally.
Gerard Krefft, Esq.	Curator of Museum at Sydney.	Would exchange all sorts, especially Reptilia.
C. Horne, Esq.	Benares.	Studies Natural History generally, and would like a list of works attainable at any, or a moderate cost.
	II.—Mammalia.	
Gerard Krefft, Esq.	Curator of Museum at Sydney.	Can supply skeletons and skins of Australian Mammalia for Indian specimens.
Lieut. R. C. Beavan.	Purulia, Manbhoom.	Collects specimens whenever practicable.
Capt. T. Hutton.	Mussoorie.	Is writing a popular account of the Mammalia of the Himalaya.
W. Theobald, Esq., Junior.	Rangoon.	Micro-Mammalia.

Name.	Address.	Particulars.
	III.—Birds.	
Lieut. R. C. Beavan.	Purulia, Manbhoom.	Collects specimens wherever practicable.
Capt. T. Hutton.	Mussoorie.	
Capt. J. Mitchell.	Supt., Madras Museum.	Particularly wants good specimens of Birds from all countries from Calcutta to (and including) the Himalayas. In exchange offers Birds of Madras Presidency, particularly the neighbourhood of Madras.
W. E. Brooks, Esq., C. E.	Tonse Bridge, Allahabad.	Ornithology and Oology especially with reference to British Birds in India. Has several duplicate eggs, too numerous to give the whole in this notice. Requires duplicate eggs of Aquila nævia, Turdus Whitei, Regulus modestus, Anthus Ricardi, Acanthylis caudacuta, Otis Macqueeni, Anser ruficollis, Sturna stolida, Sturna anglica, Sturna fuliginosa, Procellaria hesitata, Alauda brachydactyla, &c.
W. Theobald, Esq., Junior.	Rangoon.	Oology.
	IV.—Reptiles.	
Capt. R. H. Beddome.	Conservator of Forests, Ootacamund.	Collects all Indian reptiles; has a large collection of snakes from all parts of Madras Presidency particularly from the dense forests and mountains of the western side. Has discovered some 12 or 15 new species partly named by Dr. Gunther and

Name.	*Address.*	*Particulars.*
		partly by himself; has numerous duplicates, &c. He will be glad to exchange for snakes from the Khasya Hills or Assam.
Capt. J. Mitchell.	Supt., Madras Museum.	Wants reptiles in spirit (Indian.)
Gerard Krefft, Esq.	Curator of Museum. Sydney.	Has a fine series of duplicate reptiles which he is wishing to exchange.
	V.—Fish.	
Capt. J. Mitchell,	Supt., Madras Museum.	Wants fresh-water fish of North India either stuffed or in alcohol, can furnish marine fish of Madras stuffed or in spirit and some fresh water species.
Gerard Krefft, Esq.	Sydney, N. S. W.	Can exchange Australian fishes for others.
	VI.—Mollusca General.	
Sir W. Denison, K. C. B.	Madras.	Willing to purchase or exchange.
Major G. C. Evezard.	Cantonment Magistrate, Poona.	Conchology, would exchange land shells of Western India for Burmah, Java, and Bengal land and fresh water shells. Has Cyclophorus altivagus, Indicus, &c. of Poona and its neighbourhood.
Capt. Julian Hobson.	Revenue Survey, Sattara.	Ditto.
Capt. J. Mitchell.	Supt., Madras Museum.	Wants Indian land and fresh water shells from any part of the coast, can furnish Madras sea and backwater shells.

Name.	*Address.*	*Particulars.*
George French Angus, Esq.	51, Portland Villas, Portland Road, NottingHill,London, W.	The Mollusca generally. Has formed a very large collection in various parts of the world, many of which were new to science and have been described since his return to England, by Messrs. Adams, Crosse, Pfeiffer, himself, &c. Can offer for exchange duplicates of Australian shells, from time to time, properly named from the types. His desiderata would be chiefly the shells of the Japanese and Chinese seas, Kamschatka, Behring's straits, &c.—also a series of East Indian *pulmonifera* generally. All species from the Cape of Good Hope would also be acceptable, both land and marine.
Capt. G. E. Fryer.	BurmahPolice. Sandoway, Aracan.	Collects all, but chiefly freshwater and Land Mollusks.
J.E.Cox,Esq.M.D.	147 Phillipant St., Sydney.	Conchology.
Hon'ble W. Cooper.	Judge Hoboken, New Jersey, U. S.	Conchology in all its branches.
	VII.—LAND AND FRESH WATER SHELLS.	
Sir W. Denison, K. C. B.	Madras.	Would be glad to purchase or exchange specimens, wants particularly those of South America.
W. King, Esq.	Care of Messrs. Arbuthnot & Co., Madras.	Collects and has sundry duplicates; for instance, H. Basileus, H. ungulata, H. Malabarica: the 1st and 3rd of which may be interesting additions to some collections.

Name.	*Address.*	*Particulars.*
Capt. G. E. Fryer.	Burmah Police.	Collects all, but chiefly fresh-water and land mollusca.
W. H. Pease, Esq.	Honolulu, Sandwich Islands.	Is engaged cataloguing the shells of the group, and wishes shells from the east Coast of India, also shells of Murotomidæ, mitradæ and fine examples of Cyprea onyx, C. Erasta, C. pantherina, C. Pulchra, C. lentigera, also Ricinula lotata, a Var. of R. digitata found in the Seychelles. He offers in exchange, any shells from the Pacific.
Capt. R. H. Beddome.	Ootacamund.	Land shells.
C. Horne, Esq.	Benares.	Would like to know something of the land shells of these parts.
Hon'ble W. Cooper.	Hoboken N. Jersey.	Has a fine series of American land and fresh-water shells which he is willing to exchange for Indian species.
H. F. Blanford, Esq.	Bengal Club, Calcutta.	Fresh-water shells of S. E. Asia, the Eastern Archipelago, Australia, and Oceania, especially Melania, Paludomus, and Unio with a view to determine variation and distribution of the species, also any land, fresh water or marine shells from India or neighbouring countries and seas. Can exchange Ceylon Paludomi and Melaniæ and some other fresh water and land shells.
W. Theobald, Esq., Junior.	Geological Survey, Rangoon.	

Name.	*Address.*	*Particulars.*
	VIII.—Insects General.	
Lieut. R. C. Beavan.	Camp Purulia, Manbhoom.	Collects specimens of Entomology, chiefly Lepidoptera and Coleoptera.
Sir W. Denison, K. C. B.	Madras.	Willing to purchase or exchange specimens of Lepidoptera.
Capt. A. M. Lang, R. E.	Simla.	Collects all orders.
Capt. T. Hutton.	Mussoorie.	Entomology.
Capt. J. Mitchell.	Supt., Madras Museum.	Would be glad to receive Insects in exchange for specimens in other branches of the animal kingdom.
Capt. T. M. Alexander.	Sagur.	Wants names of Books giving descriptions of species.
C. Horne, Esq.	Benares.	Collects all orders, more to assist others and to note facts regarding insects than for accumulation, will be happy to give any local insect he may possess to others needing it, does not need others in exchange; but from want of local knowledge, &c. is not at present able to furnish lists.
J. C. Cox, Esq., M. D.	Sydney, N. S. W.	Entomology.
W. Theobald, Esq., Junior.	Rangoon.	Insects and crustacea.
	IX.—Coleoptera.	
Lieut. R. C. Beavan.	Camp Purulia, Manbhoom.	Collects specimens of Entomology, Coleoptera.
A. E. Russell, Esq. B. C. S.	At present, care of Messrs. Coutts & Co., Strand, London.	Collects specimens of Coleoptera.

Name.	*Address.*	*Particulars.*
Capt. T. M. Alexander, 8, Madras Cavalry.	Sagur.	Collects specimens of Coleoptera.
W. Macleay, Esq.	Sydney, N. S. W.	Has a large number of duplicates which he wishes to exchange for Indian species.
Capt. Julian Hobson.	Sattara.	Coleoptera.
	X.—Hemiptera.	
Ditto.	Sattara.	
	XI.—Hymenoptera.	
Capt. T. M. Alexander.	Sagur.	Collects specimens of Hymenoptera.
J. G. Peels.	Pharmacéen Place de la Calandre, III. Gand, Belgium.	Collects all Hymenoptera and Diptera and is ready to exchange with any Indian Entomologist but only the abovenamed orders.
W. Theobald, Esq., Junior.	Rangoon.	
	XII.—Diptera.	
J. G. Peels.		See under Hymenoptera.
	XIII.—Lepidoptera.	
Lieut. R. C. Beavan.	Camp Perulia, Manbhoom.	Collects specimens of Lepidoptera.
Sir W. Denison, K. C. B.	Madras.	Willing to purchase or exchange specimens.
Capt. A. M. Lang, R. E.	Simla.	Has a large collection of Lepidoptera from N. W. Himalaya and Punjab, would be glad to obtain in exchange, Lepidoptera of E. Himalayan India. Describes and figures transformations of Indian Lepid.

Name.	*Address.*	*Particulars.*
A. E. Russell, Esq.	Care of Messrs. Coutts and Co., Strand, London.	Collects and observes the transformations. Collections have been shipped for England where he will be glad to exchange Indian for other exotic Lepidoptera.
Capt. T. Hutton.	Mussoorie.	Has on hand a monograph of silk producing species of Indian Bombycidæ and Saturiniadæ.
Capt. J. Roberts.	Late Darjeeling.	Lepidoptera.
W. S. Atkinson, Esq.	Director of Public Instruction, Cal.	Collects Lepidoptera, will be glad to exchange Silhet and Darjeeling species for those of other parts of India, especially the Punjab, Central and Southern India; wishes also an accurate local list of Lepidoptera from all parts of India with the view of determining the geographical range of species and varieties.
Capt. T. M. Alexander.	Sagur.	Collects specimens.
W. Macleay, Esq.	Sydney, N. S. W.	Collects and has a large number of duplicates which he wishes to exchange for Indian species.
Capt. Julian Hobson.	Sattara.	
	XIV.—Diotomaceæ Microscope.	
Capt. J. Mitchell.	Supt., Madras Museum.	Interested in the microscope, wishes to work out the Diotomaceæ of the neighbourhood and considers it desirable that the Museum should have a complete collection.
Capt. Julian Hobson.	Sattara.	Desmideæ and Diatomaceæ.

Name.	*Address.*	*Particulars.*
	XV.—Botany.	
G. C. M. Birdwood, Esq., M. D.	Victoria Garden, Bombay.	Economic Botany of India, wants specimens of products and seeds of plants yielding them wants also seed vessels of all kinds for a carpological collection; willing to make exchanges, or to purchase.
H. Cleghorn, Esq., M. D.	Simla.	Economic Botany; Foresting. Has a large Herbarium of S. Indian plants and a small collection of Punjab plants.
J. L. Stewart, Esq., M. D.	Lahore.	General Economic Botany of India.
J. E. T. Aitchison. Esq., M. D.	Simla.	Botany.
Capt. R. H. Beddome.	Conservator of Forests. Madras.	Ditto.
	XVI.—Ferns.	
Capt. R. H. Beddome.	Conservator of Forests. Madras.	Collects Ferns and is publishing a work on the Ferns of India. Has duplicates of all Madras Ferns and would be glad to exchange for specimens from Khasia, Assam, &c.
	XVII.—Geology.	
F. Drew, Esq.	Srinagger, Kashmir.	Physical Geology.
Capt. T. Hutton.	Mussoorie.	Geology.
R. Bruce Foote, Esq.	Geological Survey, Madras.	
W. King, Esq.	Care of Messrs. Arbuthnot & Co., Madras.	Collects specimens illustrative of Geology and its allied branches of Natural History.

Name.	*Address.*	*Particulars.*
Capt. H. Godwin Austen.	Engineer engaged, Bhotan expedition.	Takes an interest in Geology, and has made a small collection of fossils carboniferous limestone of the Kashmir valley at Zanskar, &c. also a few from the Oolitic and other formations of that part of the Himalaya; some fossils have been sent home and have been examined by Professor Woodward; the remainder he proposes (when leisure can be obtained) to figure. Sections have been made by him of many portions of the Western Himalaya, and a Geological map of those portions that he has surveyed. To more detailed sections and an exploration of the beds abovementioned, he intends to devote a summer leave when obtainable; he has also some drawings of Buddhist remains found in the Kashmir valley.
A. M. Verchere, Esq.	Assistant Surveyor, Bunnoo, Punjab.	Has a large collection of fossils and rocks from Salt Range, Kashmir, &c., is anxious to enter into correspondence with any person who knows of beds of Carboniferous limestone in India (not in the Punjab or western Himalaya) especially in the Eastern Himalaya.
	XVIII.—ETHNOLOGY.	
W. King, Esq.	Geological Survey, care of Messrs. Arbuthnot & Co., Madras.	Is interested in evidences of the prehistoric origin of man and has in conjunction with Mr. Foote of the Geological

Name.	*Address.*	*Particulars.*
		Survey, discovered a great number of chipped stone weapons or implements, scattered about and buried in the alluvial deposits in the neighbourhood of Madras; may probably have duplicates during the year and will be glad to exchange for specimens from the parts of India especially the smooth or polished variety of these "Celts."
Capt. C. L. R. Glasfurd.	Deputy Commissioner, Sironcha. Central Provinces.	Indo-Scythian remains and affinities between the wild tribes in the vicinity of the Godavery and the Todas, Kotturs, &c. of the Neilgherries.
Ditto.	Ditto.	Would be glad to meet with a correspondent who could give him information regarding the customs religion and traditions of the Sonthals, and of the wild tribes in Assam, and on the N. E. frontier, or of Scythian remains in these parts.
	XIX.—ARCHÆOLOGY.	
Rev. M. A. Sherring.	Benares.	Especially interested in the Archæology of Benares and its neighbourhood.
Col. J. Abbott.	Umballa.	Antiquities of all kinds, Geographical, Architectural, Ethnological, including sculpture, numismatics, engraving traditions, &c., especially such as relate to the successors of Alexander in the East.

Name.	*Address.*	*Particulars.*
C. Horne, Esq.	Benares.	Archæology, especially Buddhist remains, and collects coins for others.
Capt. H. H. Godwin Austen.	Dehra Dhoon.	Has some drawings of Buddhist remains found in the Kashmir valley.
Baboo Rajendralala Mitra.	Manicktollah, Calcutta.	Has a collection of Sanscrit MSS. of which he would gladly have copies made for those requiring them. Has the Taittiríya A'ranyaka in the press and wants a copy of Sáyana's commentary on the same for collation.
	XX.—Coins.	
Lieut. Ayrton Pullan.	Topographical Asst. of G. T. Survey, of India, Dehra Dhoon or Mussoorie.	Will be happy to make exchanges of silver or copper Bactrian or Hindoo coins.
Major George G. Pearse, R. A.	Care of Messrs. Arbuthnot & Co., Madras.	Collects Bactrian coins, gems, and ancient Indian coins; requires coins of Archibeus, Amyntas, Pantaleon, Dionysius, Artemon, Artemidorus, Epander, Zoilus, Teleppus and Pakores and any good copper coins of Eucratides and Agathon. Requires gems. Has large number of Mahamedan coins of all ages, Cashmere coins and modern coins for disposal, also coins of Alexander the Great.
Col. J. Abbott.	Commanding 5th Horse Brigade Royal Artillery, Umballa.	Has at present no wish to exchange duplicate coins.

Name.	*Address.*	*Particulars.*
C. W. Wilmott, Esq.	Assistant Commissioner, Deoghur.	Has formed a small collection of foreign and other coins.
Baboo Rajendralala Mitra.	Manicktollah, Calcutta.	Has a few coins; wishes to exchange duplicates.

NOTES AND QUERIES,

Zoology.

1. "I see in Blyth's Catalogue that he makes Inuus Assamensis of McClelland and Innus pelops of Hodgson to be one and the same. They are totally distinct species the former inhabiting—"Subhimalayan region, Asám"—and the other being strictly confined to the Northern forests bordering on the snows in Nipal, Kumaon, Mussooree and Simla. Mr. Blyth never saw a specimen of Pithex (Inuus) pelops of Hodgson. I think Dr. Jerdon is convinced of the distinctness of our species as I showed him a living individual." Capt. T. Hutton, *Mussoorie.*

2. What books are attainable respecting the wasps and ants of India at a moderate cost? In what Journals and of what date may papers be found on these subjects? Is there any work with coloured or plain illustrations of the Dragon Flies of India? C. Horne, *Benares.*

Numismatics.

3. Since dies of the ancient coins have been engraved at Rawul Pindee it is hard to pronounce on the genuineness of coins purchased. Most of the forgeries are smeared with lamp-black mixed either with water or with oil. Boiling water or the action of oil of turpentine will remove this; whereas the oxide on an old coin can be removed only by mechanical action on the edge of a sharp tool. Col. J. Abbott, *Umballa.*